

# Green Capital Needs Assessment and Replacement Reserve Analysis

Prepared for:

**Connecticut Housing and Finance Authority**  
999 West Street  
Rocky Hill, CT 06067

and

Recap Real Estate Advisors  
38 Chauncy Street, Suite 600  
Boston, MA 02111



38 Chauncy Street, Suite 600 | Boston, MA 02111  
T: 617.338.9484 | F: 617.338.9422

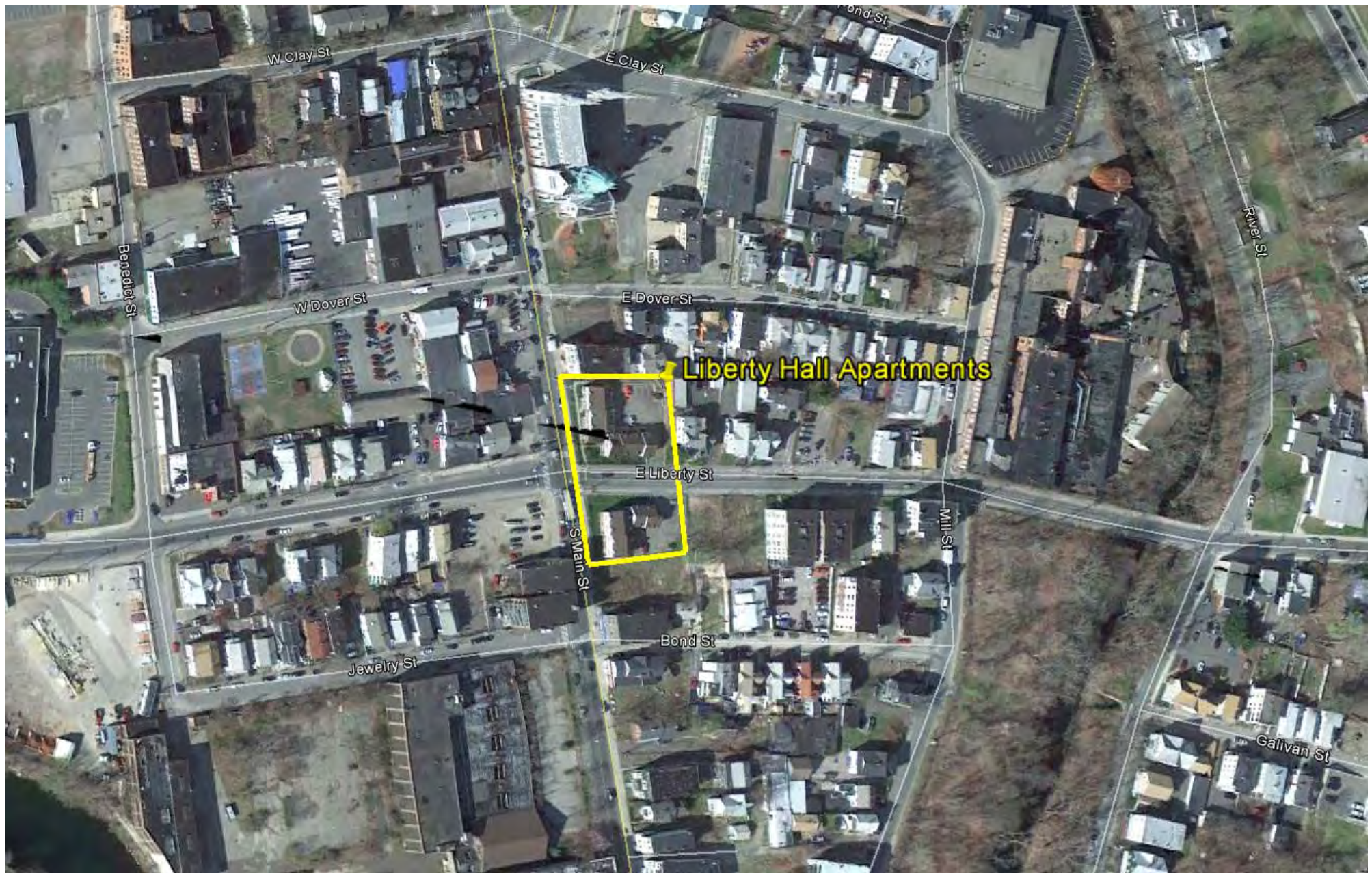
[on-site-insight.com](http://on-site-insight.com)



Liberty Hall Apartments  
CHFA # 90133D  
St. Vincent de Paul of Waterbury  
Waterbury, CT

**April 30, 2013**

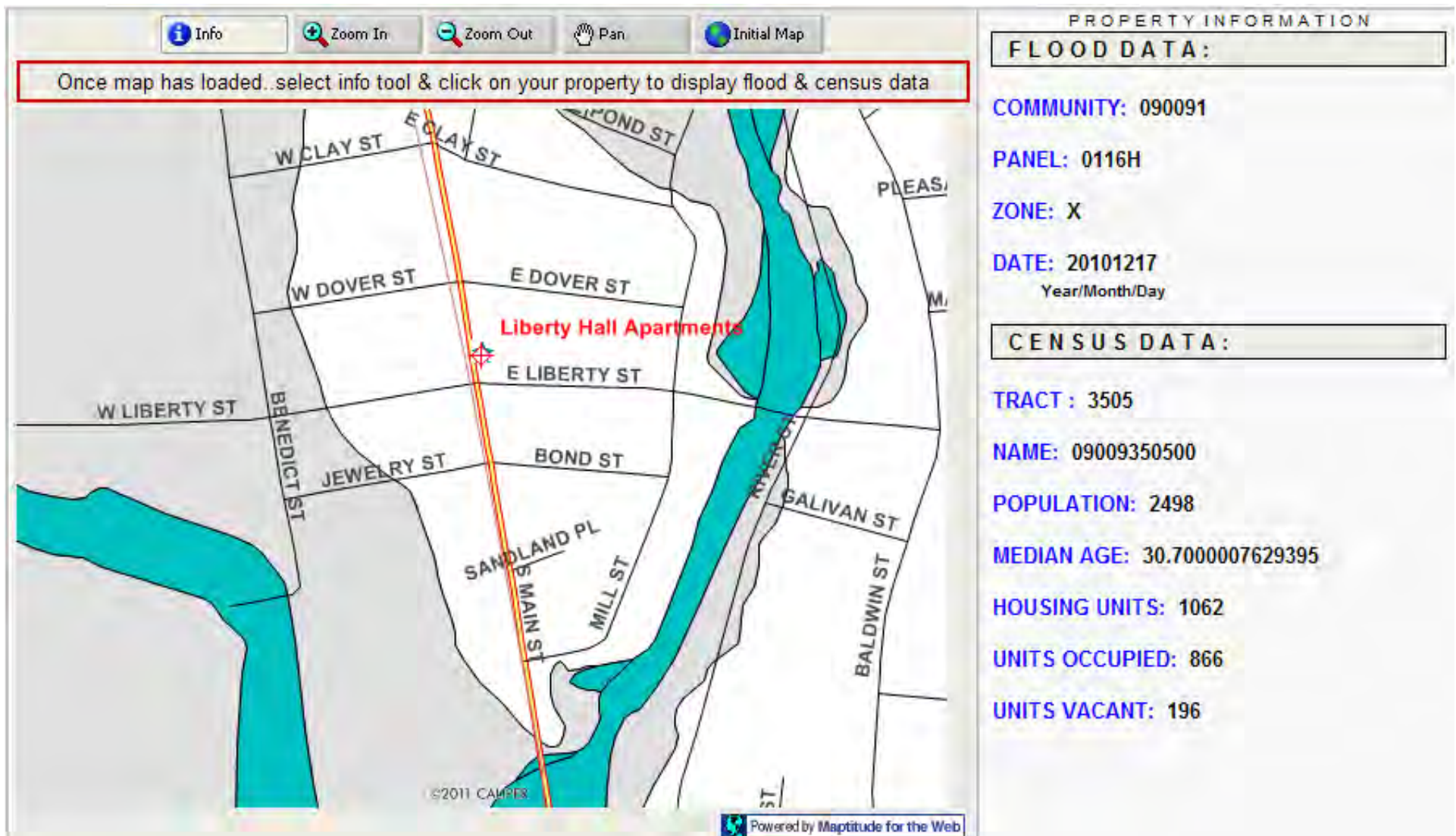
*Final Report*



## **Liberty Hall Apartments**

575 South Main Street  
Waterbury, CT 06706





## Liberty Hall Apartments

575 South Main Street  
Waterbury, CT 06706

Zone X = Outside the 500-year floodplain to be  
Outside the 1% and 0.2% annual chance floodplains.

# Table of Contents

## FINDINGS AND RECOMMENDATIONS

1.0	EXECUTIVE SUMMARY.....	Pages 1-7
2.0	NARRATIVE .....	Pages 8-34
3.0	PHOTO PAGES .....	Pages 35-41

## SUPPORTING DATA

1.0	CAPITAL NEEDS SUMMARY - CONVENTIONAL .....	Pages 42-44
2.0	REPLACEMENT RESERVE ANALYSIS - CONVENTIONAL.....	Pages 45-50
3.0	CAPITAL NEEDS SUMMARY - GREEN .....	Pages 51-53
4.0	REPLACEMENT RESERVE ANALYSIS - GREEN .....	Pages 54-59
5.0	CAPITAL NEEDS WORKSHEETS .....	Pages 60-81
6.0	ENERGY ANALYSIS.....	Pages 82-85
7.0	ENERGY ASSUMPTIONS.....	Pages 86-87
8.0	SIMPLE PAYBACK ANALYSES.....	Pages 88-96
9.0	LIFE CYCLE COST ANALYSES.....	Pages 97-124

## HOW TO READ THIS REPORT

The report is divided into two sections: "Findings and Recommendations" and "Supporting Data".

*Findings and Recommendations:* The three elements comprising this section constitute the main content of the report. A comprehensive list of the recommended green options and their benefits, and a snapshot of key energy findings, are included in the Executive Summary. Additional detail regarding the property's existing conditions, current and future capital needs, and green recommendations are illustrated in the narrative and photo pages.

*Supporting Data:* These nine sections contain the support data and calculations used in determining the feasibility of the green recommendations. Hard costs estimates and replacement/repair timing are presented in the capital needs worksheets. The Capital Needs Summaries and Replacement Reserve Analyses highlight the total 20-year capital costs for both the conventional and green scenarios pitted against current funding circumstances. Cost-benefit analyses are included in the Simple Payback and Life Cycle Cost "cut sheets" at the end of the report.

# Executive Summary

---

## Overview and Goals

This Green Capital Needs Assessment (GCNA) has been undertaken on behalf of Connecticut Housing Finance Authority. It is aimed at determining the development's current and prospective physical circumstances, on both a traditional and green basis. A traditional CNA focuses on those capital activities that reasonably can be expected to ensure that a property is viable and in good condition over a twenty-year horizon. In a traditional CNA, it is common for On-Site Insight (OSI) to informally comment on maintenance practices, or suggest discretionary upgrades that might affect operations, marketability, or occupant well being. This GCNA is aimed at more rigorously and more formally identifying green alternatives to conventional replacement of major components and systems. It offers options aimed at helping:

- improve energy and water efficiency,
- reduce operating and capital costs through the use of durable materials and improved maintenance,
- safeguard indoor environmental quality (IEQ) for residents, and
- reduce the property's environmental impact.

We see a number of sensible green opportunities, now and in the future, to replace existing elements with more durable and/or environmentally friendly materials and technology. In both the narrative and detailed capital needs worksheets that follow, conventional and green capital activities are presented in parallel. Capital needs summaries are presented separately for conventional and green models. The green opportunities described in the plan fall into one of two categories: energy and water conservation measures (EWCMS), or green measures (GMs), expanded in detail below:

# Executive Summary

## A Note on NPV

Net present value (NPV) is the difference in total life cycle costs between the conventional recommendation and the green recommendation. The EWCMs and GMs that carry a negative NPV are viewed as cost-prohibitive, despite potential environmental benefits or additional energy savings. In this report, OSI does not recommend measures that carry a negative NPV.

## Energy and Water Conservation Measures (EWCMs):

In the report, 9 energy and water conservation measures (EWCMs) are identified. Energy and water conservation measures are upgrades and improvements to existing mechanical and electrical systems that have a direct impact on energy consumption, and therefore potential utility (electric, gas, oil, water, sewer) savings if implemented appropriately. As part of the inspection process, the property's utility data was analyzed. This information is then used as part of the EWCM recommendation and calculation process.

Certain EWCMs are interactive. In order to achieve the projected annual energy savings for an interactive group, the EWCMs must be implemented in concert with one another. If any of the interactive EWCMs are deferred or foregone, there may be a significant impact on the utility savings outlook. For example, replacement of an inefficient boiler system may not achieve projected utility savings associated with that system if inefficient windows remain in place.

The energy conservation measure specifications (i.e. boiler efficiencies, R-values, U-values) presented in this plan are mostly derived from the International Energy Code and the American Society of Heating, Refrigeration and Air-Conditioning (ASHRAE) Handbook. These measures represent one conceptual option; various alternatives may yield different results. It must be noted that a number of factors may affect the estimated annual energy savings and simple payback periods, and therefore the figures outlined in this report are not guaranteed.

# Executive Summary

## Green Measures (GMs):

The report identifies 5 Green Measures (GMs). Green measures are replacements of existing materials and systems that do not have a direct impact on energy consumption; however, they represent opportunities to reduce capital and operational expenditures in the future due to increased durability, enhanced performance, and increased expected useful life (EUL) potential. Additionally, if implemented properly, GMs can improve indoor environmental quality and can benefit resident and staff health, safety, and well-being.

The life cycle costs for the GMs are calculated in the attached worksheets with the comparative life cycle cost for the conventional replacement alternatives. Other GMs included in the plan do not represent enhanced performance or extended expected useful lives, and therefore the life cycle costs for these GMs are not calculated. Many of the projected savings are based on certain performance and EUL criteria for the respective systems and materials. Several factors may impede upon the expected performance and may skew the estimated savings. In this case, the savings presented in the plan are estimated and cannot be guaranteed.

## Building Modeling Methodology

This report uses an energy model created in TREAT to determine the energy loads (electric and fossil fuel uses including heating, domestic hot water, and non-heating systems) for this property. The TREAT model is based on building-specific construction, HVAC systems, and other building systems (i.e. lighting, appliances, etc.) as identified by the inspection team. The energy model also incorporates 12 months of utility bills, and matches weather data to the utility billing period.

Using the SUNREL™ energy simulation software developed by the National Renewable Energy Laboratory (NREL), TREAT calculates energy uses on an hourly basis (again factoring in weather/climate, existing HVAC systems, and internal gains) for an entire year. The result produces calculated energy use for the property, and proposed energy savings for identified measures. The energy savings are shown both independently and with full interaction of all measures.

## Executive Summary

Additional measures such as water usage, which is currently not modeled in TREAT, has been presented using OSI's existing utility models. Also, since TREAT evaluates the building as a whole, it is possible that measures reduce electric consumption, could also show an increase in heating requirements (i.e. lighting reduction reduces heat typically produced by the original lighting system and in turn would require an increase to the heating load). The calculated loads (electricity, natural gas) are reconciled against billed utility loads within a 10% margin.



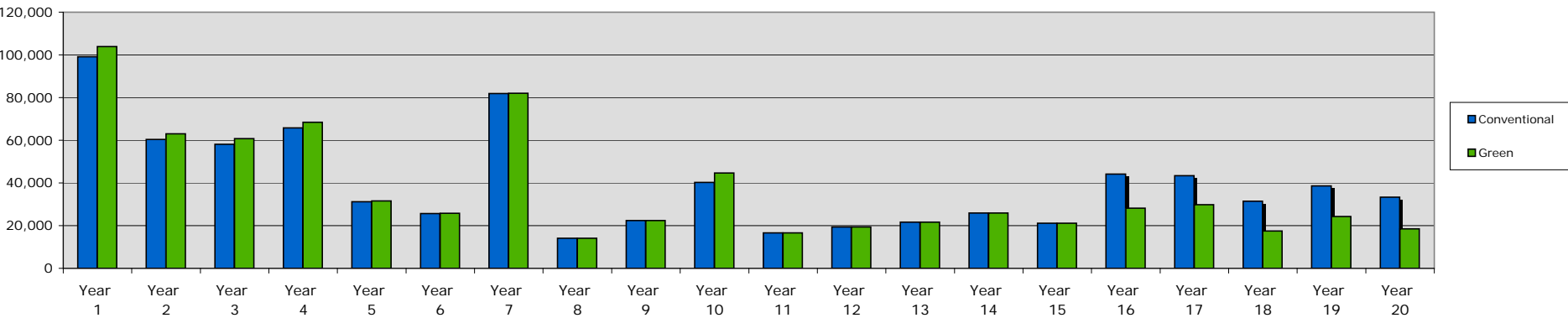
# Executive Summary

## Dashboard

### Property Data

Location:	Waterbury, CT
Year Built:	1990
Number of Units:	16
Number of Buildings:	2

Comparison of Capital Needs - Conventional vs. Green



### Environmental Impact

(Total Carbon Release Based on Current Annual Energy Usage)

Building Square Footage:	<b>382</b>
Resident Population ( <i>estimated</i> ):	<b>35</b>

	BTUs/yr	Conversion	lbs CO <sub>2</sub>	lbs CO <sub>2</sub> / Res
Gas	69,467,461	x 11.023100	7,657	219
Oil	0	x 11.023100	0	0
Electricity	45,594,556	x 1.582917	21,146	604
<b>Total</b>	<b>115,062,017</b>		<b>28,804</b>	<b>823</b>

### Replacement Reserve Analysis

#### Conventional

- Plan #1: Capital costs exceed reserves in Years 2-20.
- Plan #2: Infusion of \$352,000 in Year 1.

#### Green

- Plan #1: Capital costs exceed reserves in Years 2-20.
- Plan #2: Infusion of \$336,000 in Year 1.

### Health and Safety

#### Hazardous Materials

	Identified	Location / Notes
Lead Based Paint (LBP):	Not tested	-
Asbestos Containing Materials (ACMs):	Not tested	-
Mold:	Not tested	-

#### Indoor Ventilation

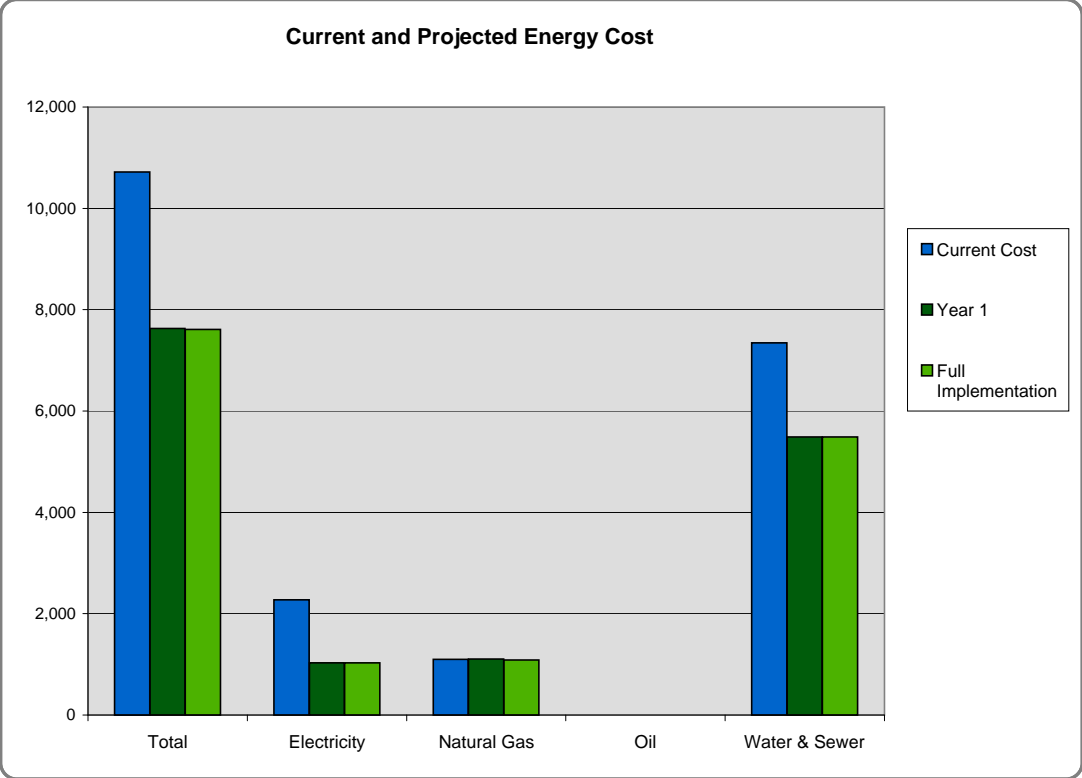
Bathroom and kitchen exhaust fans. Operable windows and doors.

#### Indoor Air Quality (IAQ)

	Design Specification	Actual Read	Notes
Air Flow Rate	No mechanical ventilation	-	
Thermal Comfort	68-72	67-72	-
Carbon Monoxide	0	0	Dwlling Units
Carbon Dioxide	<1000	914-1120	-

# Executive Summary

## Energy Savings



Energy Intensity / Benchmarking Data

TREAT Modeled Data

Building Square Footage:382

Office square footage

Heating Degree Days:6,023

TREAT Model

	Amount	Units	BTUs/yr	Energy Intensity (BTUs/(HDDs x SF)
Heating	265	therms	26,515,073	12
Cooling	266	therms	26,573,971	12
DHW	75	therms	7,520,427	3
Electricity	13,363	kWh	45,594,556	20
Total			106,204,027	46

	Gallons/yr	Gallons/sf/yr
Water	862,502	2,258

Energy Usage Summary							
Billing Data							
Utility	Current Usage		Current Cost	Projected Usage		Projected Cost	% Savings
Electricity	13,363	kWh	\$2,271	6,067	kWh	\$1,031	54.6%
Natural Gas	695	therms	\$1,098	687	therms	\$1,086	1.1%
Oil	0	gallons	\$0	0	gallons	\$0	n/a
Water & Sewer	862,502	gallons	\$7,346	644,656	gallons	\$5,491	25.3%
Total			\$10,715			\$7,608	29.0%

# Executive Summary

## Green Improvement Plan

						Annual Utility Savings									
Measure	Upfront Cost	EUL	Simple SIR <sup>1</sup>	Incremental Cost <sup>2</sup>	Green NPV <sup>4</sup>	Electric		Gas		Oil		Water & Sewer		Total \$	Recommended Timing
						KWh	\$	Therms	\$	Gallons	\$	Gallons	\$		

Recommended EWCMs (Based on Financial Analysis)

Interactive Group															
EWCM 3 - Windows (Office)	763	35	0.87	53	278			12	19					19	Future
EWCM 5 - Replace Refrigerator	720	15	2.14	50	71	634	108	(3)	(5)					103	Immediate
EWCM 6 - Convert Lighting	990	15	1.80	990	765	744	127	(5)	(8)					119	Immediate
EWCM 9 - Replace Showerheads	296	20	104.86	296	20,235							182,208	1,552	1,552	Immediate
Interactive Group Total <sup>5</sup>	2,769			1,389			235		12				1,552	1,799	
EWCM 1 - Convert Lighting (Exterior)	12,024	15	1.25	839	12,358	5,913	1,005							1,005	Immediate
EWCM 8 - Replace Toilets	7,224	25	1.05	504	689							35,624	303	303	Immediate
EWCM Subtotal	22,017			2,732		5,913	1,240	0	12	0	0	35,624	1,855	3,107	

Recommended GMs (Based on Financial Analysis)

GM 1 - Fencing	16,591	25		3,825	699	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Year 10
GM 3 - Install Linoleum	64,247	25		4,467	18,404	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Immediate
GM Subtotal	80,838			8,292		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	

Total	102,855			11,024		5,913	1,240	0	12	0	0	35,624	1,855	3,107	
-------	---------	--	--	--------	--	-------	-------	---	----	---	---	--------	-------	-------	--

Optional Actions

EWCM 2 - Replace Boiler	3,794	20	0.00	1,081	(1,190)									0	Immediate
EWCM 4 - Add Roof Insulation	676	20	0.00	676	(446)									0	Immediate
GM 2 - Install Cement Board Siding	62,033	30	0.00	62,033	(53,083)									0	Immediate
GM 4 - Recycled Content Countertops	21,600	25	0.00	11,473	(2,867)									0	Immediate
GM 5 - Install Metal Roofing	75,478	50	0.00	43,698	(28,168)									0	Immediate

Notes:

1. Simple SIR is calculated as (Total Annual Savings \* Estimated Useful Life) / Upfront Cost.
2. Incremental Cost is the difference in cost between the green and conventional alternatives.
3. Green SIR (Savings to Investment Ratio) is a relative measure that reflects the ratio of total savings to total investment of Green vs. Conventional. Unlike Simple SIR, this calculation takes into account maintenance costs, inflation, discounting, and differences in expected useful life.
4. Green NPV is the net present value of installing a green vs. conventional product.
5. Interactive group total recognizes full interaction of all measures based on the TREAT model.

# Narrative

**Liberty Hall Apartments** is a development designed for occupancy by families. The buildings contain a total of 16 units, all of which feature direct access. The unit breakdown is as follows: 7 one-bedroom units, 6 two-bedroom units, and 3 three-bedroom units. The building was originally constructed in 1990.

## Site

### Site Surface

Liberty Hall Apartments is located on a small parcel of land in Waterbury, CT. The site is bisected by East Liberty Street. No capital costs are carried for landscaping improvements, as they are understood to be handled from operations. If, at some future date, management contemplates re-landscaping, OSI recommends attention to sustainable design. Conventional landscaping relies on large lawns, non-native species, extensive irrigation, and heavy use of fertilizers and pesticides. This type of landscaping also tends to be labor-intensive. There are design features that can enhance soil quality, and reduce storm water run-off and pollution. Such measures can also minimize water usage, maintenance costs, and green waste.

### Roadways and Parking Areas

Existing conditions	Capital needs	Green alternative
A parking area is located behind each of the two buildings. The parking areas feature original asphalt paved surfaces exhibiting some cracking and minor settlement.	Future costs to resurface the parking area are shown in Year 4. Costs to crack-fill, seal coat, and restripe the asphalt parking area as needed throughout the plan.	Consider resurfacing with a light colored aggregate martial. A lighting colored asphalt material will reflect heat and reduce the heat island effect.

## Narrative

### Pedestrian Walkways

Existing conditions	Capital needs	Green alternative
The walkways were observed to be in good overall condition.	Costs are shown for as needed repair/replacement throughout the plans timeframe.	Repairs and replacements using Portland cement with at least 20% recycled-content materials is recommended. This measure increases the durability and strength of the concrete, and reduces greenhouse gas emissions associated with cement production. Where contractors are familiar with the product, there is little or no incremental cost to this option. We are uncertain about local market circumstances with regard to it. A separate cost option is not shown for this here.



## Narrative

### Fencing & Gates

Existing conditions	Capital needs	Green alternative
A chain linked fence runs along part of the property line. The fence was observed to be in good condition. There are no dumpster enclosures surrounding the two trash areas.	Costs to replace the fencing are shown as needed in Year 10 of the plan. Costs to add a chain linked dumpster enclosure are shown in Year 1 of the plan.	<b>GM #1</b>  Install FSC certified wood fencing in place of the existing chain linked models.

### Site Lighting

Existing conditions	Capital needs	Green alternative
The parking area is illuminated by two pole mounted high-pressure sodium fixtures. The lights are controlled by photocells.	Replacement costs for the site lighting are shown in Year 1 of the plan.	<b>EWCM #1</b>  Replace the existing fixtures with high efficiency LED models. LEDs use significantly less electricity and have a longer expected useful life than traditional HID fixtures.

## Narrative

### Accessibility

Existing conditions	Capital needs	Green alternative
The site parking area lacks compliant parking spaces.	The designated parking spaces must be restriped to comply with accessibility requirements.	No green alternatives.
The laundry equipment is not compliant and is incorrectly positioned in the laundry room.  The office doors lack level-type door hardware.	Request compliant laundry equipment from vendor and reposition.  Install compliant door hardware.	No green alternatives.

## Narrative

### Mechanical Room

The boiler and hot water heater serving the office and laundry room are located in the basement. The mechanical room could not be accessed during the assessment. The boiler and domestic hot water tank were not visually inspected. Sizes were estimated based on the descriptions given during the inspection.

#### Boilers

Existing conditions	Capital needs	Green alternative
An atmospheric (standard efficiency boiler) heats the office area and laundry room. The boiler size is estimated to be approximately 60MBH.	Costs are shown to replace the boiler in Year 2 of the plan.	<b>EWCM #2</b> Install a high efficiency condensing boiler with weather controls. A condensing boiler will typically have a combustion efficiency of 93% to 96% and operate with lower hydronic supply and return temperatures (160°F and 135°F, respectively). The resultant flue gases are also low temperature (below 100°F) and require either stainless steel or heat-resistant plastic (CPVC) flues to address corrosive flue vapors. The replacement cost also includes the boiler controls. The dedicated boiler would be sized appropriately to produce adequate hot water for the building.

**Narrative**

Domestic Hot Water		
Existing conditions	Capital needs	Green alternative
The laundry room hot water is generated by the heating boiler and stored in a 40-gallon indirect storage tank.	Replacement costs are shown in Year 1 of the plan.	No green alternative recommended.

## **Narrative**

### **Building Mechanical and Electrical Systems**

The major building systems include fire suppression, distribution piping systems for hydronic heat, domestic hot and cold water, sanitary wastewater, and natural gas services, as well as electrical and fire detection.



## Narrative

### Building Architectural Systems

#### Building Exterior

Liberty Hall Apartments is comprised of two buildings. One two-story and one three-story building with a total of 16 apartments. The building is constructed on a poured concrete foundation. No issues were observed or reported with regard to the building framing and it should be monitored going forward.

#### Doors

Existing conditions	Capital needs	Green alternative
Exterior common doors include the front and rear office door and two common hallway/stairwell doors. The doors were observed to be in good overall condition. The existing doors are insulated steel models.	Costs to replace doors are shown in Year 12 of the plan.	Consider replacing existing doors with insulated fiberglass models.
There are fifteen exterior unit doors at the development. The doors are insulated metal models	Costs to replace the dwelling unit doors are shown starting in Year 12.	Consider replacing existing doors with insulated fiberglass models.  <i>Resident paid utilities. Not savings to owner paid utilities.</i>
One metal service door provides access to the basement mechanical room located under the Office.	Replacement costs are shown in Year 7.	No green alternatives.

## Narrative

### Siding

Existing conditions	Capital needs	Green alternative
The exterior is clad with faux brick EFIS and cement board. The first floor features the faux brick which was observed to be in fair to poor condition. The EFIS is easily damaged by resident and vehicular impacts and is difficult to repair properly. The upper floors feature cement board siding that was observed to be in good overall condition.	Costs are shown throughout the plan for repair/replacement of the EIFS. Future painting costs for the cement board are shown in Year 10.	<b>GM #2</b>  Replace the EFIS with more durable cement board. The fiber cement board is easier to repair and can be spot painted or replace to fix anticipated damage.

### Windows / Curtain Walls

Existing conditions	Capital needs	Green alternative
The property features single glazed, wood framed windows. The windows were observed to be in fair overall condition.	Costs are shown to replace all windows with comparable double pane, single-hung models in Year 7.	Consider replacing windows with fiberglass-framed, double-glazed models with a low-E (low emissivity) coating, and a gas fill between the glazing layers. The low-e coating will reflect heat from entering the building during the summer, and can reflect radiant infrared energy from escaping the building during the heating months.

## Narrative

Existing conditions	Capital needs	Green alternative
		<p>A gas fill (such as argon) between the glazing layers will reduce heat transfer through the glass similar to the low-e coating. It is recommended that the windows be monitored and appropriately caulked going forward to keep air infiltration to a minimum.</p> <p><i>Resident paid utilities. No savings calculations.</i></p>
<p>The office features similar wood framed, single paned windows.</p>	<p>Replace the windows with code compliant, double pane models.</p>	<p><b>EWCM #3</b></p> <p>Consider replacing windows with fiberglass-framed, double-glazed models with a low-E (low emissivity) coating, and a gas fill between the glazing layers. The low-e coating will reflect heat from entering the building during the summer, and can reflect radiant infrared energy from escaping the building during the heating months.</p>

## Narrative

### Building Mounted Lighting

Existing conditions	Capital needs	Green alternative
Small 50 watt high pressure sodium wall packs and larger 150watt wallpacks are located at each entryway to the building.	Costs to replace the wallpacks are shown in Years 1 and 16.	<b>EWCM#1</b>  Install high efficiency LED replacement.

### Roof

Existing conditions	Capital needs	Green alternative
The composite shingle roof is original to the development. The roofing was observed to be in poor overall condition. Many replacement sections were observed during the assessment.	Costs to replace the roof are shown in Year 1 of the plan.	Consider replacing the traditional composite shingle roofing with long-lived metal tile roofing. The metal tile roof should be a light color to help reflect heat and reduce the heat island effect.  <b>EWCM #4</b>  Add 7-inches of blown in cellulose.  Increasing the office ceiling insulation to R-38.

## **Narrative**

### **Note:**

We do not, as yet, recommend a 'green vegetative roof' – the installation of soil and vegetation on a waterproof membrane - as an option. While these may also reduce roof temperatures and cooling loads, and reduce storm water run-off, they are much more expensive than conventional systems, and we see too many questions about performance and maintenance.



## Narrative

### Building Interior Common Areas

The building interior includes the common hallways and stairwells, a management office, and a public laundry facility. Wall and ceiling surfaces are painted drywall or wallpapered throughout. Allowances are shown throughout the plan for as-needed repairs and painting. As a green measure, the plan specifies low-VOC or recycled-content paint for painting and low VOC adhesives and wallpaper products are shown at no additional premium.

#### Interior Finishes

Existing conditions	Capital needs	Green alternative
The limited interior common areas feature painted ceiling and walls.	Costs are shown to paint interior walls in Years 1 and 11.	Specify low volatile organic compound (VOC) and/or recycled-content paint (content should be at least 50% recycled; VOCs should not exceed 250 grams per liter). In addition specify low VOC wallpaper and adhesives.
The hallway, laundry room, and management office feature vinyl composite tile (VCT). The VCT is original to the development. Common stairs feature rubber stair treads.	Costs to replace vinyl flooring as shown in Years 1 and 16 of the plan.	<b>GM #3</b> Replace vinyl/carpet flooring with linoleum products. Linoleum is a natural product (containing linseed oil, powdered wood or cork, ground limestone, resin binders, natural jute backing), which has been found to be more durable than its vinyl tile counterpart.

## Narrative

Existing conditions	Capital needs	Green alternative
		Linoleum tile hardens over time, and therefore becomes less susceptible to scratching and cracking. Installation of linoleum has a lower annual life cycle cost than vinyl and keeps the vinyl product out of our landfills in the future.

### Interior Lighting

Existing conditions	Capital needs	Green alternative
Interior lighting is a mix of and four lamp T8 fluorescent fixtures and CFL lamped fixtures.	Maintain from Operating	<b>EWCM #6</b>  Retrofit existing fixtures with LED lamps and occupancy sensors in some of the support/common rooms. LED lamps will reduce utility costs and reduce operations costs.

## Narrative

### Office Appliances

Existing conditions	Capital needs	Green alternative
The office features a frost-free refrigerator for use by site staff and management.	Costs to replace the refrigerator are shown in Years 1 and 16.	<b>EWCM #5</b>  Install an Energy Star refrigerator. The Energy star model with use significantly less electricity than the existing model.

### Laundry room

Existing conditions	Capital needs	Green alternative
The laundry room features non Energy Star washers and gas dryers. The equipment is leased.	Operating	<b>EWCM #7</b>  Consider requesting Energy Star models from the vendor. High-efficiency models (specifically, models with an Energy Star rating) utilize less water (as much as 40% less) than traditional washing machines, and the lower demand for hot water also has an energy-savings component.  No green recommendation is included for the dryers, since no high-efficiency models are available.

# Narrative

## Dwelling Units

During the course of the assessment, OSI gained access to 3 units accounting for 19% of the total. These were distributed among all unit types. A sample of this size is felt to be sufficient given the age, tenancy, design, and location of the development. Additional information about units and capital replacements was obtained from discussions with residents during inspections and additional capital history forms submitted by management.

Living Area Finishes		
Existing conditions	Capital needs	Green alternative
Units feature painted walls and ceilings.	Operating	<p>Specify low VOC products when refinishing interior surfaces.</p> <p>Conventional paint, wallpaper, and adhesives contain thousands of chemicals, many of which are know toxins. Some of the most harmful chemicals are volatile organic compounds (VOCs).</p> <p>VOCs are unstable, carbon-containing compounds that readily vaporize into the air causing air pollution and poor indoor air quality.</p>

## Narrative

Existing conditions	Capital needs	Green alternative
Unit living areas, kitchens and bedrooms feature VCT covered areas. Most VCT is understood to be original to the development.	Costs are shown to replace the VCT as needed throughout the plan based on a fifteen year expected useful life.	<b>GM #3</b>  Replace vinyl/carpet flooring with linoleum products. Linoleum is a natural product (containing linseed oil, powdered wood or cork, ground limestone, resin binders, natural jute backing), which has been found to be more durable than its vinyl tile counterpart.

## Bathrooms

Existing conditions	Capital needs	Green alternative
Some damage was observed with respect to the original fiberglass tubs and surrounds.  Bathroom showers feature 2.0gpm showerheads.	Costs are shown to replace the tubs as needed throughout the plans as needed.	<b>EWCM #9</b>  Install low flow 1.7gpm showerheads to reduce water consumptions and domestic hot water use.

## Narrative

Existing conditions	Capital needs	Green alternative
Bathrooms feature plywood vanities. The vanities are original to the development.	Future replacement allowances are shown starting in Year 2 of the plan.	Install FSC certified wood vanities.
Dwelling unit toilets are 1.6 gpf low flow models. Some of the toilets have been replaced with dual flush models.	Costs to replace the toilets are shown as needed.	<b>EWCM #8</b> Replace 1.6gpf models with high efficiency 1.28gpf models to achieve the maximum water savings.
Bathroom exhaust fans are mostly original to the development.	Costs to replace the fans are shown throughout the plan.	Install Energy Star exhaust fans with humidastats to improve indoor air quality.

## Narrative

### Kitchens

Existing conditions	Capital needs	Green alternative
<p>Kitchen cabinets are plywood models with Laminated particleboard (LPB) countertops. All cabinetry dates back to original construction of the development. Most cabinets were observed to be in fair to poor condition.</p>	<p>Costs to replace cabinets and countertops are shown starting in Year 2. Future countertop replacements costs are shown starting in Year 12 of the plan. Costs to replace the rangehoods are shown concurrent with cabinet replacement.</p>	<p>Cabinets are shown being replaced with a comparable green product such as bamboo or wood cabinets that are certified by the Forest Stewardship Council (FSC).</p> <p><b>GM #4</b></p> <p>Replace countertops with either a recycled content solid stone surface.</p>
<p>Units feature 30-inch electric ranges and frost-free Energy Star refrigerators. The refrigerators were all recently replaced.</p>	<p>Costs are shown for as needed replacement.</p>	<p>Consider installing Energy Star rated refrigerators.</p> <p><i>Resident paid utilities. No savings calculations.</i></p>

## Narrative

### Unit Mechanical

Existing conditions	Capital needs	Green alternative
Each dwelling unit features a hot water boiler. Rated at approximately 70MBH. The boilers also heat domestic hot water which is stored in separate indirect hot water tanks. Four boilers have been replaced in recent years.	Replacement costs are shown starting in Year 1. Costs to replace the thermostats are shown starting in Years 1 and 16 of the plan.	No green alternative recommended.
Each dwelling unit features a 40-gallon indirect hot water tank. Approximately seven DHW tank have been replaced in recent years.	Costs to replace older hot water tanks are shown starting in Year 1. Future replacement costs for newer models are shown starting in Year 8.	No suitable green alternative



**Narrative**

Unit Electrical		
Existing conditions	Capital needs	Green alternative
Dwelling units feature living area smoke detectors and carbon dioxide detectors.	Costs are shown to install bedroom smoke detectors starting in Year 1. Future replacement costs are shown starting in Years 8 and 15.	No green alternative.

## **Narrative**

### **Health and Safety**

#### Resident and Staff Concerns:

As part of the assessment, the property was examined for potential resident and staff health and safety concerns.

#### *Lead-Based Paint and Asbestos:*

- OSI did not conduct any testing for asbestos containing material (ACMs) or for lead-based paint (LBP). Therefore, this section should not be interpreted as a comprehensive or conclusive identification of ACMs or LBP. No areas or components containing LPBs or ACMs were identified or reported.

#### *Other Health and Safety Issues:*

- DHW temperatures should be in the range of 110°F to 130°F; at temperatures of 140°F, burns (scalding) can occur.

#### Indoor Air Quality:

##### *Ventilation (Common Areas and Apartments):*

This building has no mechanically supplied fresh air. Each occupied space has a series of operable windows to provide fresh air. The exhaust fans located in each unit (bathrooms and rangehoods) are run as needed.

## Narrative

### *Temperature, Humidity, Carbon Dioxide (CO<sub>2</sub>)*

Space temperature and humidity are the key components for comfort level. Temperature and relative humidity was measured in conditioned spaces (management office, dwelling unit, common hallway). The temperature of the conditioned spaces ranged between 67-72°F db, and the humidity ranged from 24-34% rH.

Carbon dioxide levels were measured during the inspection, and are included in Table B below. Carbon Monoxide was also tested during the inspection and is included in Table C below.

### *Mold and airborne concerns:*

No mold was observed on the interior of the apartments, nor in any common spaces at the property.

### *Reporting:*

The tables below describe actual conditions versus design specifications for flow rate and carbon dioxide. The “Notes” column describes a possible reason for a discrepancy between these values where applicable.

Table A. Flow Rate:

Conditioned Space	Actual Read	Design Specification	Notes
Hallways / Stairwells			N/A No mechanical ventilation
Community Room			N/A No mechanical ventilation
Office			N/A No mechanical ventilation
Apartment			N/A No mechanical ventilation

## Narrative

Table B. Carbon Dioxide:

Space	Actual Read	Design Specification	Notes
Hallways / Stairwells	914	< 1,000 ppm	Conditioned space
Office	1120	< 1,000 ppm	Conditioned space
Apartment	990	< 1,000 ppm	Conditioned space
Apartment	923	< 1,000 ppm	Conditioned space

Table C. Carbon Monoxide:

Conditioned Space	Actual Read	Design Specification	Notes
Hallways / Stairwells		≈0 ppm	Carbon Monoxide level was not measured.
Community Room		≈0 ppm	Carbon Monoxide level was not measured.
Office			Carbon Monoxide level was not measured.
Apartment		≈0 ppm	Carbon Monoxide level was not measured.

## Narrative

### Capital Needs Summary, Replacement Reserve Analysis - *Conventional*

Future capital actions are based on useful life expectations and assume continued effective maintenance and physical management. The timing of actions by system (including quantities and costs) is also presented in the Capital Needs Worksheet. Costs for the twenty-year plan total \$640,345 in current dollars (\$40,021/unit), or \$794,441 (\$49,653/unit) in inflated dollars.

Two approaches to funding the property's physical needs through replacement reserves are presented in the Replacement Reserve Analysis section of the report, with accompanying graphics.

**Plan #1** presents current capital funding circumstances. The development is estimated to have a replacement reserve balance of \$95,765 on December 31, 2012. Annual contributions are currently \$10,155 per year, or \$635 per unit. From OSI's experience, this is seen as an inadequate funding level for a property of this age and complexity. For planning purposes here, these contributions are shown being indexed at 3% for inflation going forward. Under this scenario, the property's needs exceed reserves in Years 2-20.

**Plan #2**, as one alternative, is aimed at fully meeting projected needs through Year 20. It starts with the same annual funding assumptions outlined above. The plan calls for an infusion of \$352,000 in outside capital in Year 1 to help fund near term capital needs. This is one hypothetical option, and is included for illustrative purposes only. No assumptions are made about its viability; various alternatives might achieve similar results.

## Narrative

### Capital Needs Summary, Replacement Reserve Analysis - *Green*

Future capital actions are based on useful life expectations and assume continued effective maintenance and physical management. The timing of actions by system (including quantities and costs) is also presented in the Capital Needs Worksheet. Costs for the twenty-year plan total \$612,368 (\$38,273/unit) in current dollars, or \$739,361 (\$46,210/unit) in inflated dollars.

Two approaches to funding the property's physical needs through replacement reserves are presented in the Replacement Reserve Analysis section of the report, with accompanying graphics.

**Plan #1** presents current capital funding circumstances. The development is estimated to have a replacement reserve balance of \$95,765 on December 31, 2012. Annual contributions are currently \$10,155 per year, or \$635 per unit. From OSI's experience, this is seen as an inadequate funding level for a property of this age and complexity. For planning purposes here, these contributions are shown being indexed at 3% for inflation going forward. Under this scenario, the property's needs exceed reserves in Years 2-20.

**Plan #2**, as one alternative, is aimed at fully meeting projected needs through Year 20. It starts with the same annual funding assumptions outlined above. The plan calls for an infusion of \$336,000 in outside capital in Year 1. This is one hypothetical option, and is included for illustrative purposes only. No assumptions are made about its viability; various alternatives might achieve similar results.

## Narrative

### Additional Notes:

1. The Physical Assessment of the property was conducted on March 25<sup>st</sup>, 2013. Members of the management and site staff provided information on the property's current condition, recent repairs, and near-term needs. Additional information was provided by informal interviews with residents during the dwelling unit evaluation portion of the assessment. We would like to thank site staff for their assistance.
2. OSI was represented on this assignment by Daniel Iles. Mr. Iles is a Building Performance Institute (BPI)-certified energy auditor, and LEED Green Associate accredited. Mr. Iles complied with the applicable professional standards for ethics as defined by the BPI Code of Ethics during the assessment process.
3. Regular updates of this plan are recommended to ensure careful monitoring of major building systems and to adjust the program to accommodate unanticipated circumstances surrounding the buildings, operations, and/or occupants.



View of the parking area behind building 1



Typical concrete walkways conditions



The site dumpster lacks an enclosure



View of the chain link fence enclosure





Typical building architecture



View of the building one from South Main Street



Typical unit entry



Typical window



Example of damage to the EFIS siding



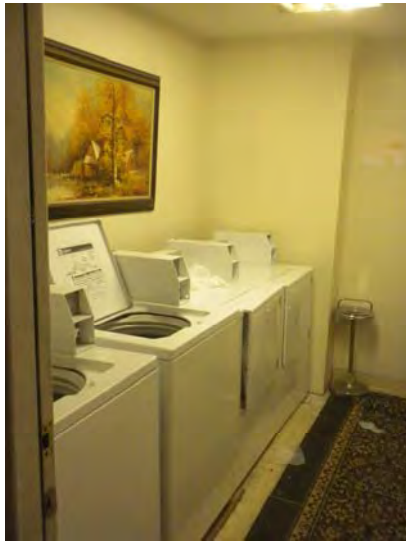
Typical building mounted lighting



View of the roof area with replacement sections



The development marker



The laundry room



The office area



Typical living area



View of a bathroom vanity





Typical unit bathroom



Unit bathroom medicine cabinet



Unit kitchen cabinets and Refrigerator



Typical unit kitchen



Typical light fixture and living area smoke detector



Wall mounted thermostats



Boiler and in-direct domestic hot water tank  
(located in a basement)



Boiler located in a utility closet.

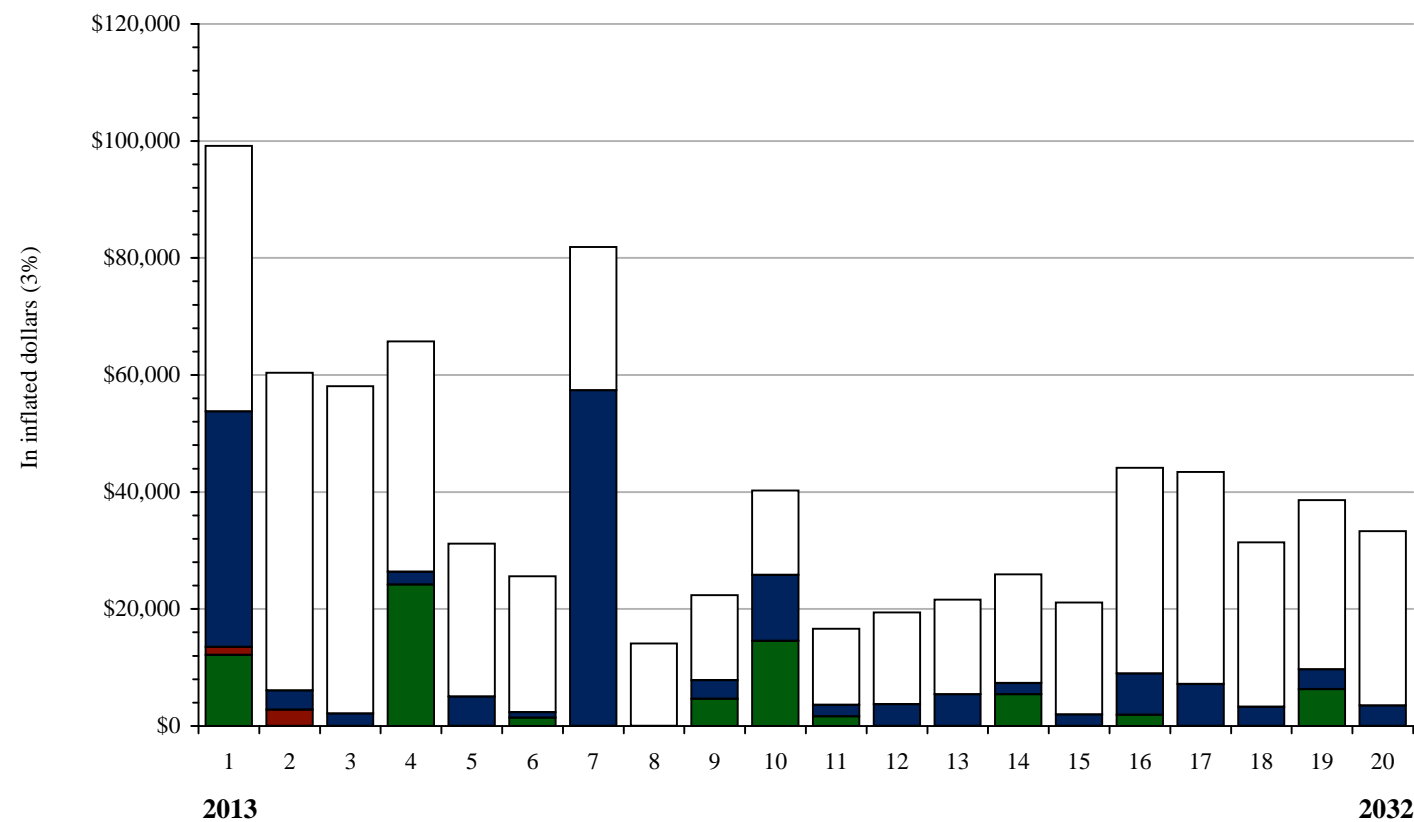


Original in-direct domestic hot water storage tank



Typical dwelling unit circuit breaker

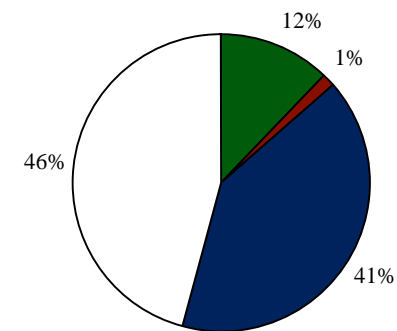
Capital Needs Summary - Conventional



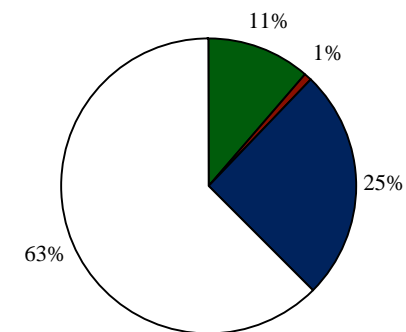
Total Costs by Building System (inflated dollars)

	Year 1	Years 1-10	Years 1-20
Site Systems & Accessibility	\$12,133 or \$758/unit	\$56,975 or \$3,561/unit	\$72,264 or \$4,517/unit
Mechanical Room	\$1,350 or \$84/unit	\$4,144 or \$259/unit	\$4,144 or \$259/unit
Building Mech. & Elec.			
Building Architectural	\$40,258 or \$2,516/unit	\$125,591 or \$7,849/unit	\$164,924 or \$10,308/unit
Dwelling Units	\$45,407 or \$2,838/unit	\$312,102 or \$19,506/unit	\$553,109 or \$34,569/unit
In inflated dollars:	\$99,147 or \$6,197/unit	\$498,813 or \$31,176/unit	\$794,441 or \$49,653/unit
In current dollars:	\$99,147 or \$6,197/unit	\$451,083 or \$28,193/unit	\$640,345 or \$40,022/unit

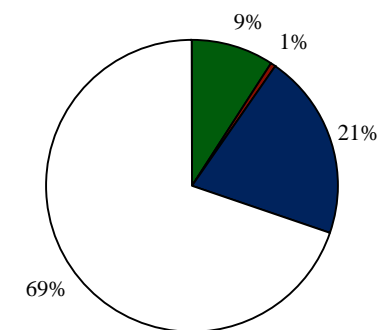
Liberty Hall Apartments



Year One Distribution



Ten Year Distribution



Twenty Year Distribution

## Capital Needs Summary - *Conventional*

OSI Ref: **13186**  
 Property Age: **23 Years**  
 Financing: **CHFA**

Residential Buildings: **2**  
 Total Number of Units: **16**  
 Occupancy: **Families**

	2013 Year 1	2014 Year 2	2015 Year 3	2016 Year 4	2017 Year 5	2018 Year 6	2019 Year 7	2020 Year 8	2021 Year 9	2022 Year 10
<b>Site Systems &amp; Accessibility</b>										
Surface	\$12,133	\$0	\$0	\$24,186	\$0	\$1,435	\$0	\$0	\$4,673	\$14,549
Accessibility	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Site Sub-Total	<b>\$12,133</b>	<b>\$0</b>	<b>\$0</b>	<b>\$24,186</b>	<b>\$0</b>	<b>\$1,435</b>	<b>\$0</b>	<b>\$0</b>	<b>\$4,673</b>	<b>\$14,549</b>
<b>Mechanical Room</b>										
Boilers	\$0	\$2,794	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Boiler Room Systems	\$1,350	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Mechanical Sub-Total	<b>\$1,350</b>	<b>\$2,794</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
<b>Building Mech. &amp; Electrical</b>										
Mechanical	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Electrical	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Elevators	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Mechanical & Electrical Sub-Total	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
<b>Building Architectural</b>										
Structural and Exterior	\$4,482	\$2,051	\$2,112	\$2,176	\$5,044	\$907	\$57,386	\$0	\$3,155	\$11,290
Roof Systems	\$31,779	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Halls, Stairs, Lobbies	\$1,048	\$1,213	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Community Spaces	\$2,949	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Building Architectural Sub-Total	<b>\$40,258</b>	<b>\$3,264</b>	<b>\$2,112</b>	<b>\$2,176</b>	<b>\$5,044</b>	<b>\$907</b>	<b>\$57,386</b>	<b>\$0</b>	<b>\$3,155</b>	<b>\$11,290</b>
<b>Dwelling Units</b>										
Living Areas	\$12,767	\$13,150	\$13,544	\$13,951	\$1,156	\$1,191	\$1,728	\$1,780	\$1,834	\$1,341
Bathrooms	\$0	\$5,420	\$5,583	\$5,750	\$5,923	\$3,843	\$3,958	\$2,115	\$2,179	\$2,244
Kitchens	\$3,364	\$14,125	\$14,549	\$14,985	\$14,211	\$13,240	\$13,638	\$1,318	\$1,358	\$1,399
Mechanical & Electrical	\$29,276	\$21,646	\$22,296	\$4,716	\$4,858	\$5,003	\$5,153	\$8,899	\$9,166	\$9,441
Dwelling Units Sub-Total	<b>\$45,407</b>	<b>\$54,342</b>	<b>\$55,972</b>	<b>\$39,403</b>	<b>\$26,148</b>	<b>\$23,278</b>	<b>\$24,478</b>	<b>\$14,113</b>	<b>\$14,537</b>	<b>\$14,425</b>
<b>Total Capital Costs</b>	<b>\$99,147</b>	<b>\$60,399</b>	<b>\$58,084</b>	<b>\$65,765</b>	<b>\$31,192</b>	<b>\$25,619</b>	<b>\$81,864</b>	<b>\$14,113</b>	<b>\$22,365</b>	<b>\$40,263</b>

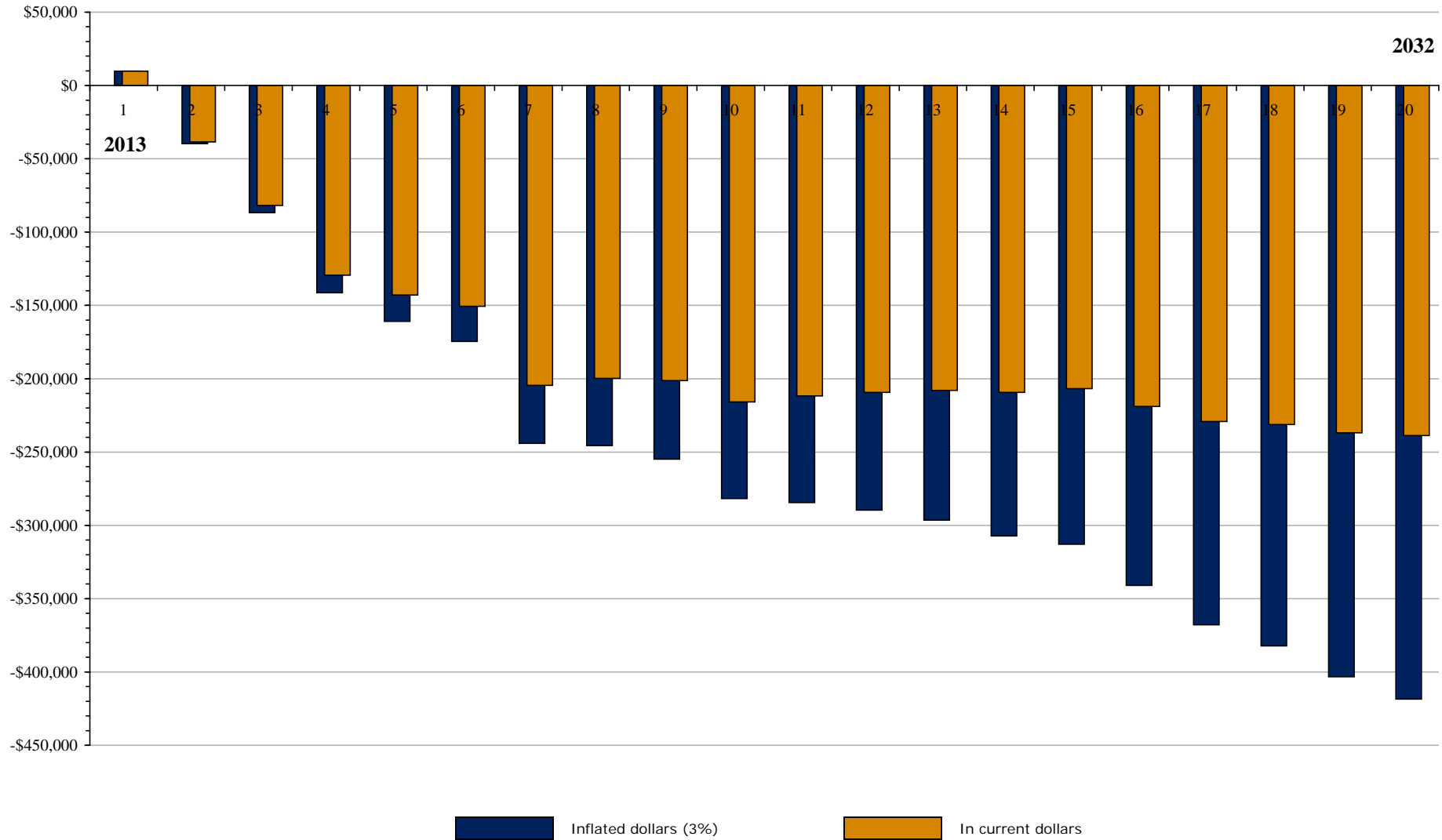


# Liberty Hall Apartments

Costs on these pages are aggregated by category from the Capital Needs worksheets which follow. Total capital costs on these pages are carried forward to line F of the Replacement Reserve Analysis(es) that follow.

2023 Year 11	2024 Year 12	2025 Year 13	2026 Year 14	2027 Year 15	2028 Year 16	2029 Year 17	2030 Year 18	2031 Year 19	2032 Year 20	
\$1,663	\$0	\$0	\$5,417	\$0	\$1,928	\$0	\$0	\$6,280	\$0	<b>Site Systems &amp; Accessibility</b>
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	Surface Accessibility
<b>\$1,663</b>	<b>\$0</b>	<b>\$0</b>	<b>\$5,417</b>	<b>\$0</b>	<b>\$1,928</b>	<b>\$0</b>	<b>\$0</b>	<b>\$6,280</b>	<b>\$0</b>	Site Sub-Total
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	<b>Mechanical Room</b>
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	Boilers
										Boiler Room Systems
<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	Mechanical Sub-Total
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	<b>Building Mech. &amp; Electrical</b>
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	Mechanical
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	Electrical
										Elevators
<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	Mechanical & Electrical Sub-Total
\$0	\$3,701	\$5,395	\$1,900	\$1,957	\$3,102	\$7,192	\$3,291	\$3,390	\$3,492	<b>Building Architectural</b>
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	Structural and Exterior
\$1,005	\$0	\$0	\$0	\$0	\$467	\$0	\$0	\$0	\$0	Roof Systems
\$967	\$0	\$0	\$0	\$0	\$3,474	\$0	\$0	\$0	\$0	Halls, Stairs, Lobbies
										Community Spaces
<b>\$1,971</b>	<b>\$3,701</b>	<b>\$5,395</b>	<b>\$1,900</b>	<b>\$1,957</b>	<b>\$7,044</b>	<b>\$7,192</b>	<b>\$3,291</b>	<b>\$3,390</b>	<b>\$3,492</b>	Building Architectural Sub-Total
\$1,381	\$1,422	\$1,465	\$1,509	\$1,554	\$15,055	\$15,507	\$15,972	\$16,451	\$16,945	<b>Dwelling Units</b>
\$2,312	\$2,381	\$2,452	\$2,526	\$2,602	\$2,680	\$2,760	\$0	\$0	\$0	Living Areas
\$0	\$2,336	\$2,407	\$4,395	\$4,527	\$6,177	\$6,362	\$3,763	\$3,876	\$3,992	Bathrooms
\$9,301	\$9,580	\$9,868	\$10,164	\$10,469	\$11,273	\$11,612	\$8,390	\$8,641	\$8,901	Kitchens
										Mechanical & Electrical
<b>\$12,994</b>	<b>\$15,720</b>	<b>\$16,191</b>	<b>\$18,594</b>	<b>\$19,151</b>	<b>\$35,185</b>	<b>\$36,241</b>	<b>\$28,125</b>	<b>\$28,969</b>	<b>\$29,838</b>	Dwelling Units Sub-Total
<b>\$16,628</b>	<b>\$19,421</b>	<b>\$21,587</b>	<b>\$25,911</b>	<b>\$21,108</b>	<b>\$44,157</b>	<b>\$43,432</b>	<b>\$31,416</b>	<b>\$38,639</b>	<b>\$33,329</b>	<b>Total Capital Costs</b>

## Replacement Reserve (RR) Analysis: *Plan One - Conventional*



Current Replacement Reserve Balance: **\$95,765**  
 Adjusted Replacement Reserve Balance: **\$95,765**  
 Current annual contributions to reserve accounts: **\$10,155**

At the end of Year One, Reserve Balances are projected to be: **\$9,798**  
 At the end of Year 20, Reserve Balances are projected to be: **(\$418,548)**  
 Unmet needs projected in most years of the plan

## Replacement Reserve (RR) Analysis: *Plan One - Conventional*

Reserve Funding In Year 1										
Starting Balance:		\$95,765 or \$5,985/unit		Replacement Reserve (RR) analysis starts here with the starting RR balance reported, or imputed, to have been on hand at the start of Year 1, and current annual RR contributions. The projections below reflect Starting RR Balance (Line A), plus the Total Annual RR Contributions (Line D) and Interest Earnings on RR (Line E), minus Total Annual Capital Costs (Line F), taken from the CNS above. This is expressed arithmetically as (A+D+E)-F=G, Year-End Balances, then carries forward to Line A of the following Year.						
Contributions to Reserves:		\$10,155 or \$635/unit								
2013 Year 1	2014 Year 2	2015 Year 3	2016 Year 4	2017 Year 5	2018 Year 6	2019 Year 7	2020 Year 8	2021 Year 9	2022 Year 10	
\$95,765	\$9,798	(\$39,691)	(\$86,840)	(\$141,342)	(\$160,933)	(\$174,603)	(\$244,160)	(\$245,596)	(\$254,904)	
\$635	\$654	\$673	\$694	\$714	\$736	\$758	\$781	\$804	\$828	
\$10,155	\$10,460	\$10,773	\$11,097	\$11,430	\$11,772	\$12,126	\$12,489	\$12,864	\$13,250	
\$3,025	\$451	\$162	\$166	\$171	\$177	\$182	\$187	\$193	\$199	
\$108,945	\$20,708	(\$28,756)	(\$75,577)	(\$129,741)	(\$148,984)	(\$162,296)	(\$231,483)	(\$232,539)	(\$241,455)	
\$99,147	\$60,399	\$58,084	\$65,765	\$31,192	\$25,619	\$81,864	\$14,113	\$22,365	\$40,263	
\$9,798	(\$39,691)	(\$86,840)	(\$141,342)	(\$160,933)	(\$174,603)	(\$244,160)	(\$245,596)	(\$254,904)	(\$281,719)	
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	

\*ANNUAL RR CONTRIBUTIONS are shown being indexed for inflation at the % specified above except when Additional Contributions are called for.

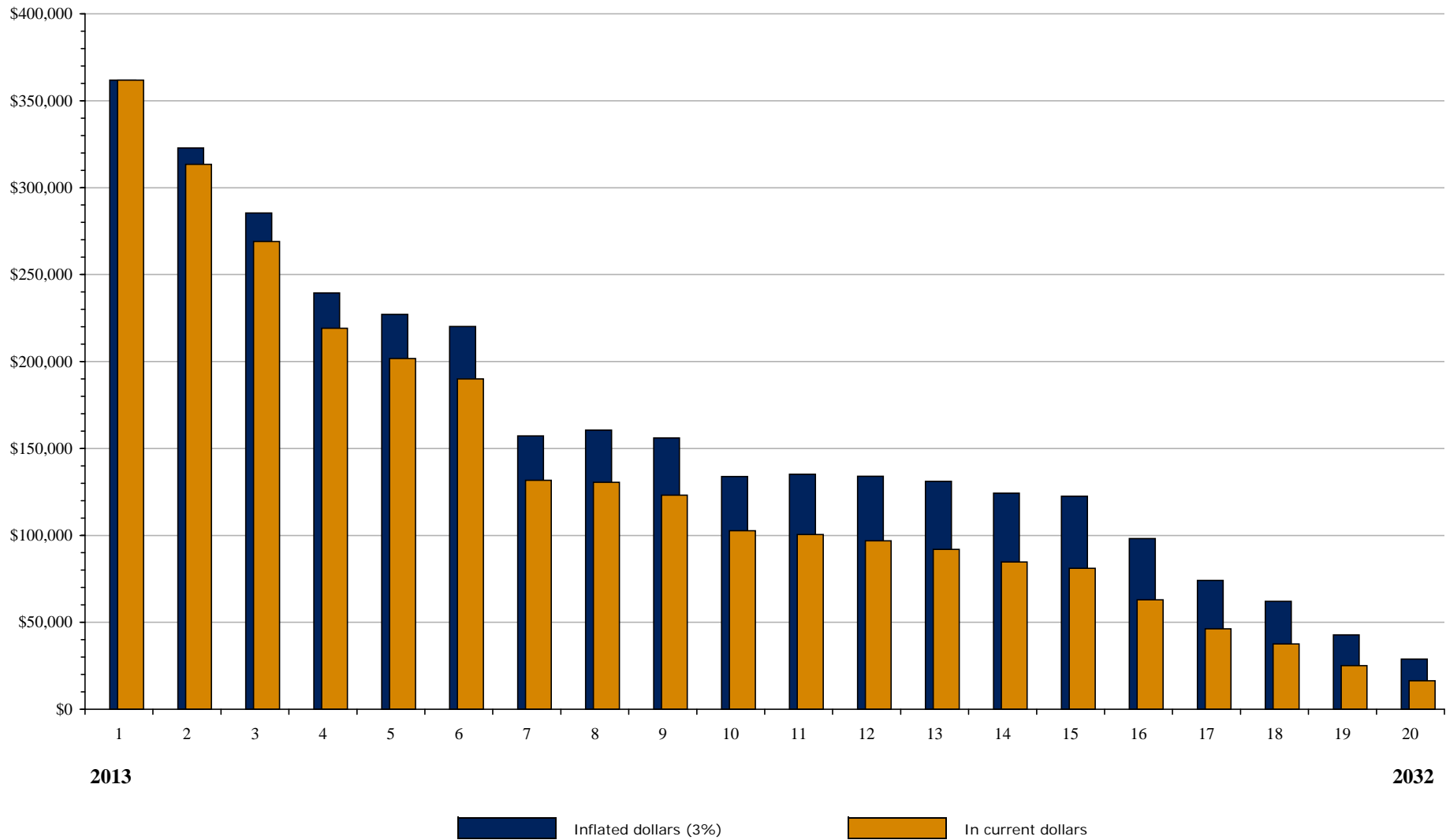
Line C, Additional Contributions allows for material adjustments in annual RR funding that would enable the property to meet all projected needs out of reserves through Year 20.

\*\*INTEREST EARNINGS ON RESERVES are calculated on 100% of starting balances and on 50% of the total annual contribution for the year at the rate shown

Replacement Reserve (RR) Analysis: Plan One - Conventional

Reserve Funding In Year 20											
Projected replacement reserve balance is (\$418,548)					This is (\$26,159)per unit in inflated dollars or (\$14,918) per unit in uninflated dollars						
Projected annual funding to reserves is \$17,807					This is \$1,113 per unit in inflated dollars or \$635 per unit in current dollars						
2023	2024	2025	2026	2027	2028	2029	2030	2031	2032		
Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20		
										Reserve Balances (A)	
(\$281,719)	(\$284,495)	(\$289,648)	(\$296,539)	(\$307,313)	(\$312,831)	(\$340,929)	(\$367,821)	(\$382,201)	(\$403,292)	Starting Replacement Reserves	
										Annual Funding (B)	
\$853	\$879	\$905	\$932	\$960	\$989	\$1,018	\$1,049	\$1,081	\$1,113	Contributions Indexed at 3%	
										Additional Unit Contributions (C)	
\$13,647	\$14,057	\$14,479	\$14,913	\$15,360	\$15,821	\$16,296	\$16,785	\$17,288	\$17,807	Total Annual Reserve Funding (D)	
\$205	\$211	\$217	\$224	\$230	\$237	\$244	\$252	\$259	\$267	Interest on Reserves at 3% (E)	
(\$267,867)	(\$270,227)	(\$274,952)	(\$281,402)	(\$291,723)	(\$296,772)	(\$324,389)	(\$350,785)	(\$364,653)	(\$385,218)	Total Funds Available	
\$16,628	\$19,421	\$21,587	\$25,911	\$21,108	\$44,157	\$43,432	\$31,416	\$38,639	\$33,329	Total Capital Cost (F)	
(\$284,495)	(\$289,648)	(\$296,539)	(\$307,313)	(\$312,831)	(\$340,929)	(\$367,821)	(\$382,201)	(\$403,292)	(\$418,548)	Reserve Balances (G)	
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0		

## Replacement Reserve (RR) Analysis: *Plan Two - Conventional*



Current Replacement Reserve Balance: **\$95,765**  
 Adjusted Replacement Reserve Balance: **\$95,765**  
 Current annual contributions to reserve accounts: **\$10,155**

At the end of Year One, Reserve Balances are projected to be: **\$361,798**  
 At the end of Year 20, Reserve Balances are projected to be: **\$28,826**  
 All projected capital needs are met throughout the plan

## Replacement Reserve (RR) Analysis: *Plan Two - Conventional*

Reserve Funding In Year 1										
Starting Balance:		\$95,765 or \$5,985/unit				Replacement Reserve (RR) analysis starts here with the starting RR balance reported, or imputed, to have been on hand at the start of Year 1, and current annual RR contributions. The projections below reflect Starting RR Balance (Line A), plus the Total Annual RR Contributions (Line D) and Interest Earnings on RR (Line E), minus Total Annual Capital Costs (Line F), taken from the CNS above. This is expressed arithmetically as (A+D+E)-F=G, Year-End Balances, then carries forward to Line A of the following Year.				
Contributions to Reserves:		\$10,155 or \$635/unit								
	2013 Year 1	2014 Year 2	2015 Year 3	2016 Year 4	2017 Year 5	2018 Year 6	2019 Year 7	2020 Year 8	2021 Year 9	2022 Year 10
<b>(A) Reserve Balances</b>										
Starting Replacement Reserves	\$95,765	\$361,798	\$322,869	\$285,406	\$239,466	\$227,059	\$220,201	\$157,250	\$160,531	\$156,039
<b>(B) Annual Funding</b>										
Contributions Indexed at 3%	\$635	\$654	\$673	\$694	\$714	\$736	\$758	\$781	\$804	\$828
<b>(C) Additional Unit Contributions</b>										
<b>(D) Total Annual Reserve Funding</b>	\$10,155	\$10,460	\$10,773	\$11,097	\$11,430	\$11,772	\$12,126	\$12,489	\$12,864	\$13,250
<b>(E) Interest on Reserves at 3%</b>	\$3,025	\$11,011	\$9,848	\$8,729	\$7,355	\$6,988	\$6,788	\$4,905	\$5,009	\$4,880
<b>Total Funds Available</b>	<b>\$108,945</b>	<b>\$383,268</b>	<b>\$343,490</b>	<b>\$305,231</b>	<b>\$258,251</b>	<b>\$245,820</b>	<b>\$239,114</b>	<b>\$174,644</b>	<b>\$178,404</b>	<b>\$174,169</b>
<b>(F) Total Capital Cost</b>	\$99,147	\$60,399	\$58,084	\$65,765	\$31,192	\$25,619	\$81,864	\$14,113	\$22,365	\$40,263
<b>(G) Reserve Balances</b>	<b>\$9,798</b>	<b>\$322,869</b>	<b>\$285,406</b>	<b>\$239,466</b>	<b>\$227,059</b>	<b>\$220,201</b>	<b>\$157,250</b>	<b>\$160,531</b>	<b>\$156,039</b>	<b>\$133,906</b>
Outside Capital:	\$352,000									
Adjusted Reserve Balances	\$361,798	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

### Notes:

1. Infusion of outside capital of \$352,000 (\$22,000/unit).

\*ANNUAL RR CONTRIBUTIONS are shown being indexed for inflation at the % specified above except when Additional Contributions are called for.

Line C, Additional Contributions allows for material adjustments in annual RR funding that would enable the property to meet all projected needs out of reserves through Year 20.

\*\*INTEREST EARNINGS ON RESERVES are calculated on 100% of starting balances and on 50% of the total annual contribution for the year at the rate shown

## Replacement Reserve (RR) Analysis: *Plan Two - Conventional*

Reserve Funding In Year 20									
Projected replacement reserve balance is <b>\$28,826</b>					This is \$1,802 per unit in inflated dollars or \$1,027 per unit in uninflated dollars				
Projected annual funding to reserves is <b>\$17,807</b>					This is \$1,113 per unit in inflated dollars or \$635 per unit in current dollars				
2023 Year 11	2024 Year 12	2025 Year 13	2026 Year 14	2027 Year 15	2028 Year 16	2029 Year 17	2030 Year 18	2031 Year 19	2032 Year 20
\$133,906	\$135,147	\$134,048	\$131,179	\$124,340	\$122,552	\$98,131	\$74,182	\$62,028	\$42,798
\$853	\$879	\$905	\$932	\$960	\$989	\$1,018	\$1,049	\$1,081	\$1,113
\$13,647	\$14,057	\$14,479	\$14,913	\$15,360	\$15,821	\$16,296	\$16,785	\$17,288	\$17,807
\$4,222	\$4,265	\$4,239	\$4,159	\$3,961	\$3,914	\$3,188	\$2,477	\$2,120	\$1,551
<b>\$151,775</b>	<b>\$153,469</b>	<b>\$152,766</b>	<b>\$150,251</b>	<b>\$143,661</b>	<b>\$142,287</b>	<b>\$117,615</b>	<b>\$93,444</b>	<b>\$81,437</b>	<b>\$62,156</b>
\$16,628	\$19,421	\$21,587	\$25,911	\$21,108	\$44,157	\$43,432	\$31,416	\$38,639	\$33,329
<b>\$135,147</b>	<b>\$134,048</b>	<b>\$131,179</b>	<b>\$124,340</b>	<b>\$122,552</b>	<b>\$98,131</b>	<b>\$74,182</b>	<b>\$62,028</b>	<b>\$42,798</b>	<b>\$28,826</b>
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

### Reserve Balances (A)

Starting Replacement Reserves

### Annual Funding (B)

Contributions Indexed at 3%

Additional Unit Contributions (C)

Total Annual Reserve Funding (D)

Interest on Reserves at 3% (E)

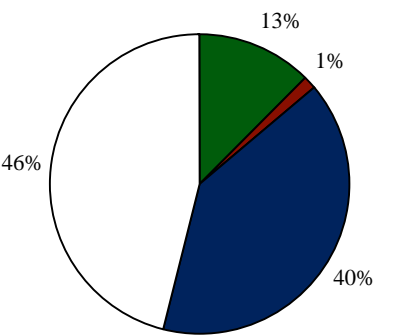
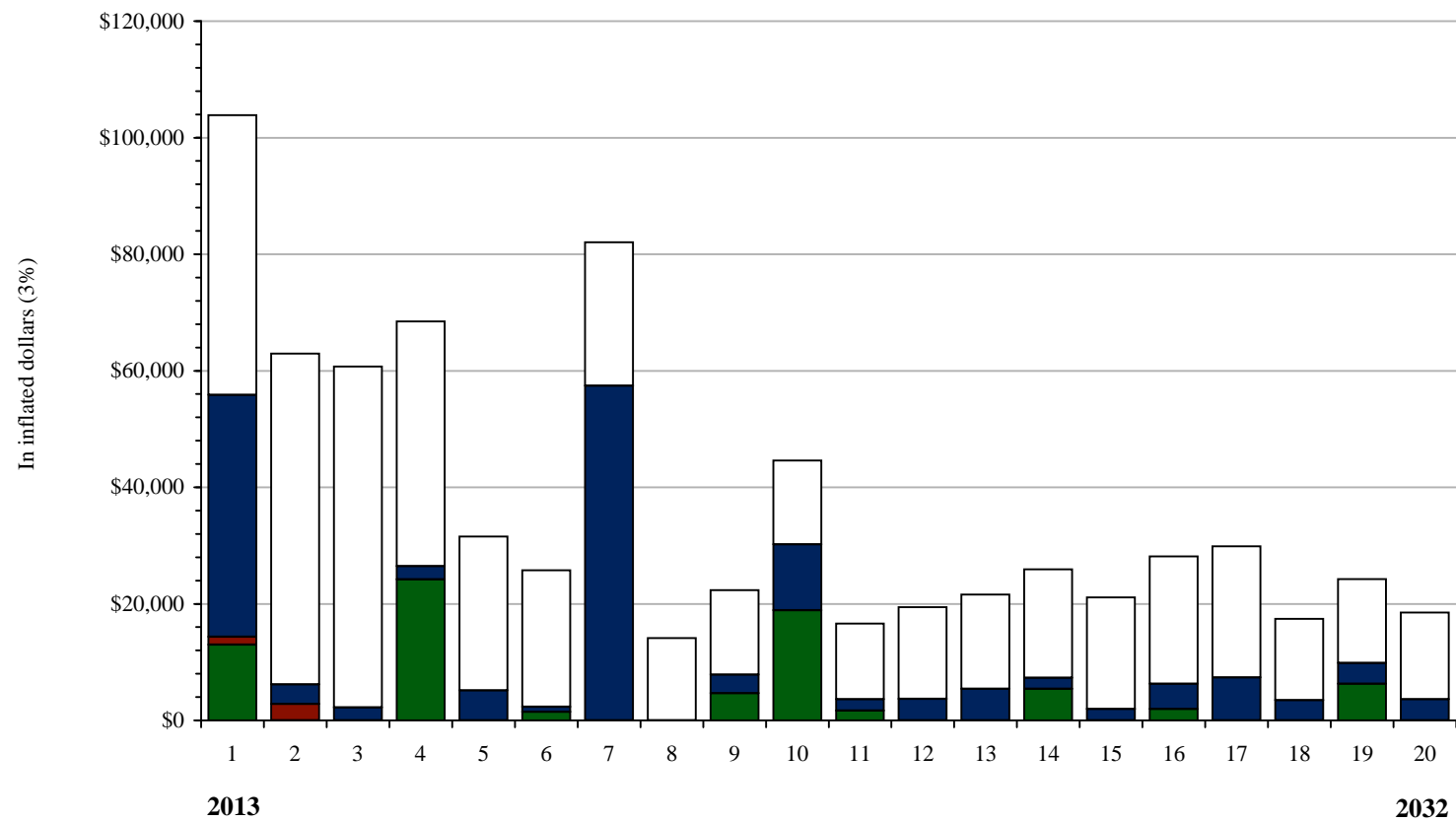
Total Funds Available

Total Capital Cost (F)

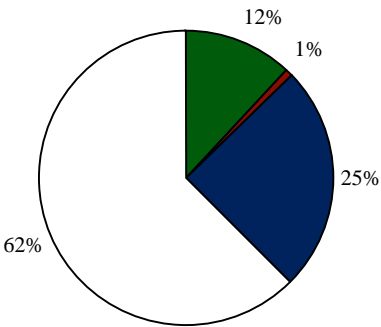
Reserve Balances (G)

Capital Needs Summary - Green

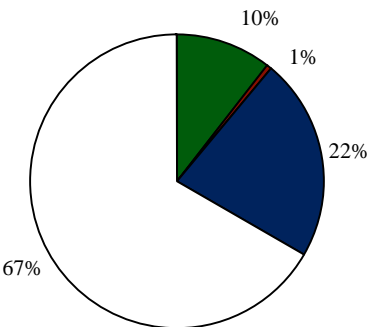
Liberty Hall Apartments



Year One Distribution



Ten Year Distribution



Twenty Year Distribution

Total Costs by Building System (inflated dollars)

	Year 1	Years 1-10	Years 1-20
Site Systems & Accessibility	\$13,002 or \$813/unit	\$62,202 or \$3,888/unit	\$77,491 or \$4,843/unit
Mechanical Room	\$1,350 or \$84/unit	\$4,144 or \$259/unit	\$4,144 or \$259/unit
Building Mech. & Elec.			
Building Architectural	\$41,528 or \$2,596/unit	\$127,316 or \$7,957/unit	\$164,579 or \$10,286/unit
Dwelling Units	\$47,980 or \$2,999/unit	\$322,821 or \$20,176/unit	\$493,147 or \$30,822/unit
In inflated dollars:	\$103,860 or \$6,491/unit	\$516,484 or \$32,280/unit	\$739,361 or \$46,210/unit
In current dollars:	\$103,860 or \$6,491/unit	\$467,190 or \$29,199/unit	\$612,369 or \$38,273/unit



## Capital Needs Summary - Green

OSI Ref: **13186**  
 Property Age: **23 Years**  
 Financing: **CHFA**

Residential Buildings: **2**  
 Total Number of Units: **16**  
 Occupancy: **Families**

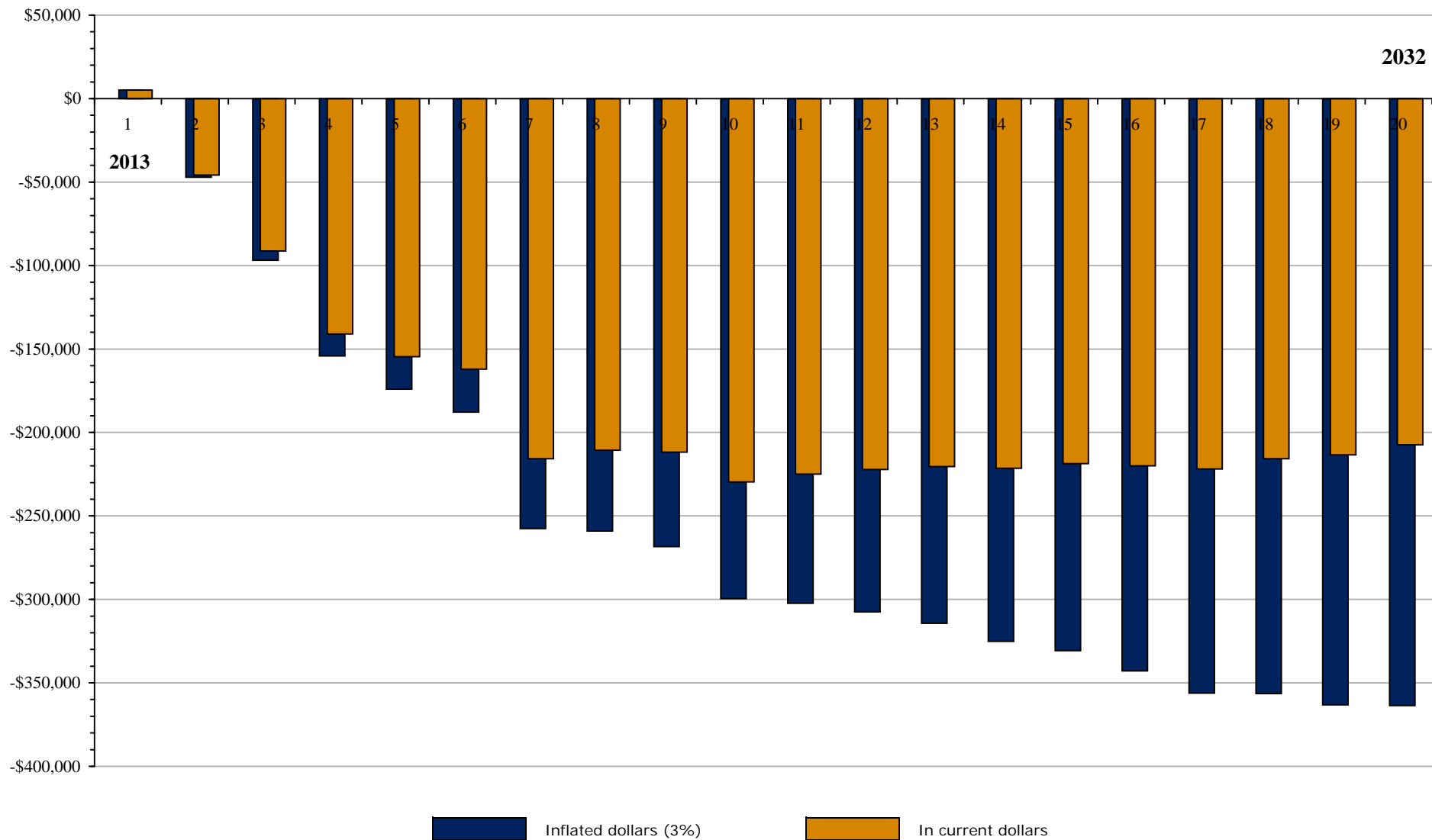
	2013 Year 1	2014 Year 2	2015 Year 3	2016 Year 4	2017 Year 5	2018 Year 6	2019 Year 7	2020 Year 8	2021 Year 9	2022 Year 10
<b>Site Systems &amp; Accessibility</b>										
Surface	\$13,002	\$0	\$0	\$24,186	\$0	\$1,435	\$0	\$0	\$4,673	\$18,906
Accessibility	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Site Sub-Total	<b>\$13,002</b>	<b>\$0</b>	<b>\$0</b>	<b>\$24,186</b>	<b>\$0</b>	<b>\$1,435</b>	<b>\$0</b>	<b>\$0</b>	<b>\$4,673</b>	<b>\$18,906</b>
<b>Mechanical Room</b>										
Boilers	\$0	\$2,794	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Boiler Room Systems	\$1,350	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Mechanical Sub-Total	<b>\$1,350</b>	<b>\$2,794</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
<b>Building Mech. &amp; Electrical</b>										
Mechanical	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Electrical	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Elevators	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Mechanical & Electrical Sub-Total	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
<b>Building Architectural</b>										
Structural and Exterior	\$4,572	\$2,144	\$2,209	\$2,275	\$5,146	\$907	\$57,450	\$0	\$3,155	\$11,290
Roof Systems	\$31,779	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Halls, Stairs, Lobbies	\$1,070	\$1,213	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Community Spaces	\$4,106	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Building Architectural Sub-Total	<b>\$41,528</b>	<b>\$3,357</b>	<b>\$2,209</b>	<b>\$2,275</b>	<b>\$5,146</b>	<b>\$907</b>	<b>\$57,450</b>	<b>\$0</b>	<b>\$3,155</b>	<b>\$11,290</b>
<b>Dwelling Units</b>										
Living Areas	\$14,953	\$15,401	\$15,863	\$16,339	\$1,156	\$1,191	\$1,728	\$1,780	\$1,834	\$1,341
Bathrooms	\$296	\$5,544	\$5,710	\$5,881	\$6,058	\$3,982	\$4,101	\$2,115	\$2,179	\$2,244
Kitchens	\$3,455	\$14,218	\$14,645	\$15,084	\$14,313	\$13,240	\$13,638	\$1,318	\$1,358	\$1,399
Mechanical & Electrical	\$29,276	\$21,646	\$22,296	\$4,716	\$4,858	\$5,003	\$5,153	\$8,899	\$9,166	\$9,441
Dwelling Units Sub-Total	<b>\$47,980</b>	<b>\$56,810</b>	<b>\$58,514</b>	<b>\$42,021</b>	<b>\$26,385</b>	<b>\$23,417</b>	<b>\$24,621</b>	<b>\$14,113</b>	<b>\$14,537</b>	<b>\$14,425</b>
<b>Total Capital Costs</b>	<b>\$103,860</b>	<b>\$62,961</b>	<b>\$60,723</b>	<b>\$68,482</b>	<b>\$31,531</b>	<b>\$25,758</b>	<b>\$82,070</b>	<b>\$14,113</b>	<b>\$22,365</b>	<b>\$44,621</b>

# Liberty Hall Apartments

Costs on these pages are aggregated by category from the Capital Needs worksheets which follow. Total capital costs on these pages are carried forward to line F of the Replacement Reserve Analysis(es) that follow.

2023 Year 11	2024 Year 12	2025 Year 13	2026 Year 14	2027 Year 15	2028 Year 16	2029 Year 17	2030 Year 18	2031 Year 19	2032 Year 20	
\$1,663	\$0	\$0	\$5,417	\$0	\$1,928	\$0	\$0	\$6,280	\$0	<b>Site Systems &amp; Accessibility</b> Surface Accessibility
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
<b>\$1,663</b>	<b>\$0</b>	<b>\$0</b>	<b>\$5,417</b>	<b>\$0</b>	<b>\$1,928</b>	<b>\$0</b>	<b>\$0</b>	<b>\$6,280</b>	<b>\$0</b>	Site Sub-Total
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	<b>Mechanical Room</b> Boilers Boiler Room Systems
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	Mechanical Sub-Total
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	<b>Building Mech. &amp; Electrical</b> Mechanical Electrical Elevators
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	Mechanical & Electrical Sub-Total
<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	
\$0	\$3,701	\$5,395	\$1,900	\$1,957	\$3,243	\$7,337	\$3,441	\$3,544	\$3,651	<b>Building Architectural</b> Structural and Exterior Roof Systems Halls, Stairs, Lobbies Community Spaces
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
\$1,005	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	Building Architectural Sub-Total
\$967	\$0	\$0	\$0	\$0	\$1,122	\$0	\$0	\$0	\$0	
<b>\$1,971</b>	<b>\$3,701</b>	<b>\$5,395</b>	<b>\$1,900</b>	<b>\$1,957</b>	<b>\$4,366</b>	<b>\$7,337</b>	<b>\$3,441</b>	<b>\$3,544</b>	<b>\$3,651</b>	
\$1,381	\$1,422	\$1,465	\$1,509	\$1,554	\$1,601	\$1,649	\$1,698	\$1,749	\$1,802	<b>Dwelling Units</b> Living Areas Bathrooms Kitchens Mechanical & Electrical
\$2,312	\$2,381	\$2,452	\$2,526	\$2,602	\$2,680	\$2,760	\$0	\$0	\$0	
\$0	\$2,336	\$2,407	\$4,395	\$4,527	\$6,318	\$6,508	\$3,913	\$4,030	\$4,151	Dwelling Units Sub-Total
\$9,301	\$9,580	\$9,868	\$10,164	\$10,469	\$11,273	\$11,612	\$8,390	\$8,641	\$8,901	
<b>\$12,994</b>	<b>\$15,720</b>	<b>\$16,191</b>	<b>\$18,594</b>	<b>\$19,151</b>	<b>\$21,872</b>	<b>\$22,528</b>	<b>\$14,001</b>	<b>\$14,421</b>	<b>\$14,854</b>	
<b>\$16,628</b>	<b>\$19,421</b>	<b>\$21,587</b>	<b>\$25,911</b>	<b>\$21,108</b>	<b>\$28,165</b>	<b>\$29,865</b>	<b>\$17,442</b>	<b>\$24,246</b>	<b>\$18,504</b>	<b>Total Capital Costs</b>

Replacement Reserve (RR) Analysis: *Plan One - Green*



Current Replacement Reserve Balance: **\$95,765**  
Adjusted Replacement Reserve Balance: **\$95,765**  
Current annual contributions to reserve accounts: **\$10,155**

At the end of Year One, Reserve Balances are projected to be: **\$5,085**  
At the end of Year 20, Reserve Balances are projected to be: **(\$363,609)**  
Unmet needs projected in most years of the plan

## Replacement Reserve (RR) Analysis: *Plan One - Green*

Reserve Funding In Year 1										
Starting Balance:		\$95,765 or \$5,985/unit		Replacement Reserve (RR) analysis starts here with the starting RR balance reported, or imputed, to have been on hand at the start of Year 1, and current annual RR contributions. The projections below reflect Starting RR Balance (Line A), plus the Total Annual RR Contributions (Line D) and Interest Earnings on RR (Line E), minus Total Annual Capital Costs (Line F), taken from the CNS above. This is expressed arithmetically as (A+D+E)-F=G, Year-End Balances, then carries forward to Line A of the following Year.						
Contributions to Reserves:		\$10,155 or \$635/unit								
	2013 Year 1	2014 Year 2	2015 Year 3	2016 Year 4	2017 Year 5	2018 Year 6	2019 Year 7	2020 Year 8	2021 Year 9	2022 Year 10
<b>(A) Reserve Balances</b>										
Starting Replacement Reserves	\$95,765	\$5,085	(\$47,106)	(\$96,894)	(\$154,113)	(\$174,043)	(\$187,852)	(\$257,615)	(\$259,051)	(\$268,359)
<b>(B) Annual Funding</b>										
Contributions Indexed at 3%	\$635	\$654	\$673	\$694	\$714	\$736	\$758	\$781	\$804	\$828
<b>(C) Additional Unit Contributions</b>										
<b>(D) Total Annual Reserve Funding</b>	\$10,155	\$10,460	\$10,773	\$11,097	\$11,430	\$11,772	\$12,126	\$12,489	\$12,864	\$13,250
<b>(E) Interest on Reserves at 3%</b>	\$3,025	\$309	\$162	\$166	\$171	\$177	\$182	\$187	\$193	\$199
<b>Total Funds Available</b>	<b>\$108,945</b>	<b>\$15,854</b>	<b>(\$36,171)</b>	<b>(\$85,631)</b>	<b>(\$142,512)</b>	<b>(\$162,094)</b>	<b>(\$175,544)</b>	<b>(\$244,938)</b>	<b>(\$245,994)</b>	<b>(\$254,910)</b>
<b>(F) Total Capital Cost</b>	\$103,860	\$62,961	\$60,723	\$68,482	\$31,531	\$25,758	\$82,070	\$14,113	\$22,365	\$44,621
<b>(G) Reserve Balances</b>	<b>\$5,085</b>	<b>(\$47,106)</b>	<b>(\$96,894)</b>	<b>(\$154,113)</b>	<b>(\$174,043)</b>	<b>(\$187,852)</b>	<b>(\$257,615)</b>	<b>(\$259,051)</b>	<b>(\$268,359)</b>	<b>(\$299,531)</b>
Outside Capital:										
Adjusted Reserve Balances	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

\*ANNUAL RR CONTRIBUTIONS are shown being indexed for inflation at the % specified above except when Additional Contributions are called for.

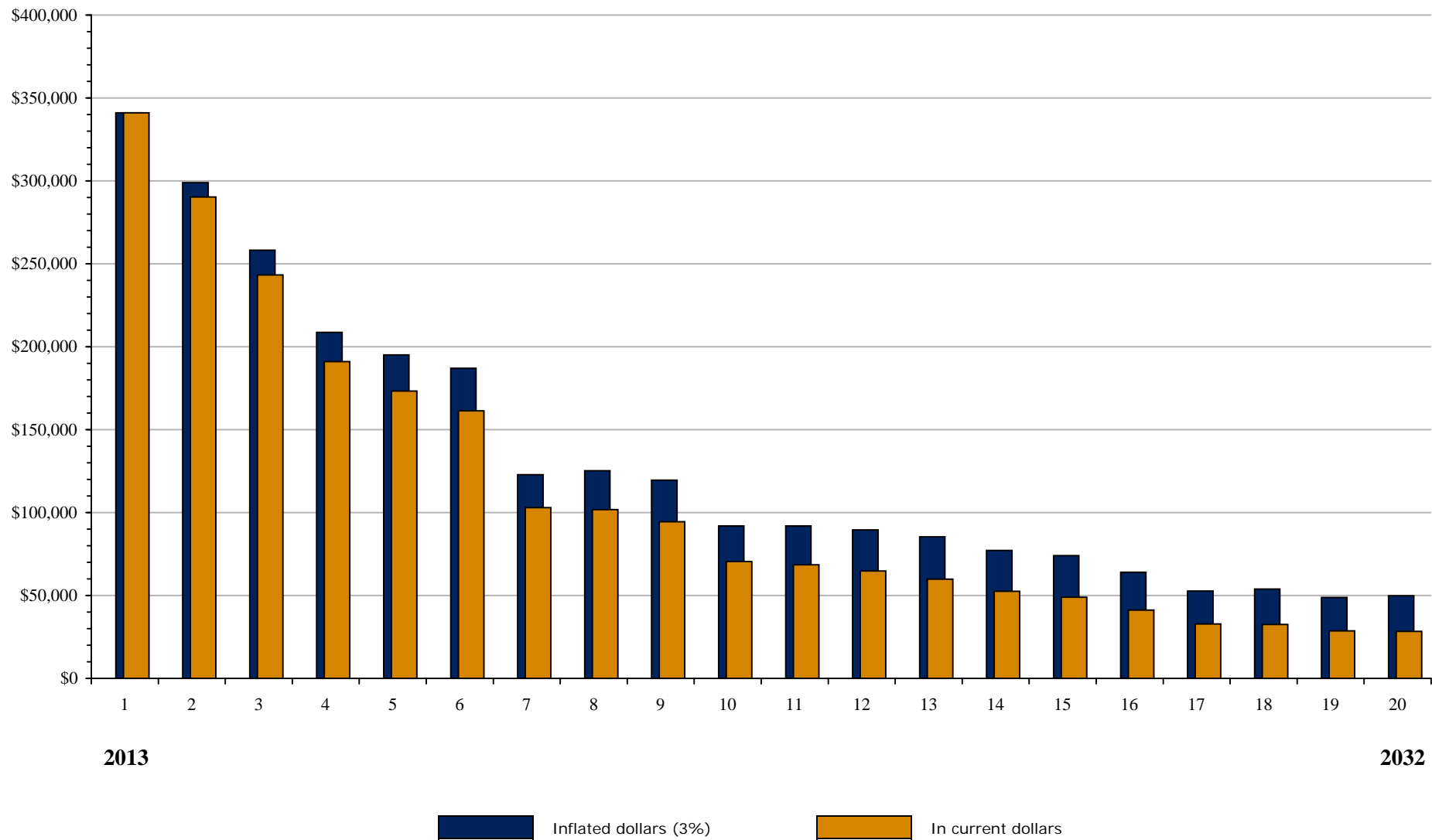
Line C, Additional Contributions allows for material adjustments in annual RR funding that would enable the property to meet all projected needs out of reserves through Year 20.

\*\*INTEREST EARNINGS ON RESERVES are calculated on 100% of starting balances and on 50% of the total annual contribution for the year at the rate shown

## Replacement Reserve (RR) Analysis: *Plan One - Green*

[illegible]

Replacement Reserve (RR) Analysis: *Plan Two - Green*



Current Replacement Reserve Balance: **\$95,765**

Adjusted Replacement Reserve Balance: **\$95,765**

Current annual contributions to reserve accounts: **\$10,155**

At the end of Year One, Reserve Balances are projected to be: **\$341,085**

At the end of Year 20, Reserve Balances are projected to be: **\$49,827**

All projected capital needs are met throughout the plan

## Replacement Reserve (RR) Analysis: *Plan Two - Green*

Reserve Funding In Year 1										
Starting Balance:		Replacement Reserve (RR) analysis starts here with the starting RR balance reported, or imputed, to have been on hand at the start of Year 1, and current annual RR contributions. The projections below reflect Starting RR Balance (Line A), plus the Total Annual RR Contributions (Line D) and Interest Earnings on RR (Line E), minus Total Annual Capital Costs (Line F), taken from the CNS above. This is expressed arithmetically as (A+D+E)-F=G, Year-End Balances, then carries forward to Line A of the following Year.								
Contributions to Reserves:										
	2013 Year 1	2014 Year 2	2015 Year 3	2016 Year 4	2017 Year 5	2018 Year 6	2019 Year 7	2020 Year 8	2021 Year 9	2022 Year 10
<b>(A) Reserve Balances</b>										
Starting Replacement Reserves	\$95,765	\$341,085	\$298,974	\$258,155	\$208,681	\$195,012	\$187,053	\$122,902	\$125,152	\$119,599
<b>(B) Annual Funding</b>										
Contributions Indexed at 3%	\$635	\$654	\$673	\$694	\$714	\$736	\$758	\$781	\$804	\$828
<b>(C) Additional Unit Contributions</b>										
<b>(D) Total Annual Reserve Funding</b>	\$10,155	\$10,460	\$10,773	\$11,097	\$11,430	\$11,772	\$12,126	\$12,489	\$12,864	\$13,250
<b>(E) Interest on Reserves at 3%</b>	\$3,025	\$10,389	\$9,131	\$7,911	\$6,432	\$6,027	\$5,793	\$3,874	\$3,948	\$3,787
<b>Total Funds Available</b>	<b>\$108,945</b>	<b>\$361,934</b>	<b>\$318,878</b>	<b>\$277,163</b>	<b>\$226,542</b>	<b>\$212,811</b>	<b>\$204,972</b>	<b>\$139,265</b>	<b>\$141,963</b>	<b>\$136,635</b>
<b>(F) Total Capital Cost</b>	\$103,860	\$62,961	\$60,723	\$68,482	\$31,531	\$25,758	\$82,070	\$14,113	\$22,365	\$44,621
<b>(G) Reserve Balances</b>	<b>\$5,085</b>	<b>\$298,974</b>	<b>\$258,155</b>	<b>\$208,681</b>	<b>\$195,012</b>	<b>\$187,053</b>	<b>\$122,902</b>	<b>\$125,152</b>	<b>\$119,599</b>	<b>\$92,015</b>
Outside Capital:	<b>\$336,000</b>									
Adjusted Reserve Balances	\$341,085	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

### Notes:

#### 1. Infusion of outside capital of \$336,000 (\$21,000/unit).

\*ANNUAL RR CONTRIBUTIONS are shown being indexed for inflation at the % specified above except when Additional Contributions are called for.

Line C, Additional Contributions allows for material adjustments in annual RR funding that would enable the property to meet all projected needs out of reserves through Year 20.

\*\*INTEREST EARNINGS ON RESERVES are calculated on 100% of starting balances and on 50% of the total annual contribution for the year at the rate shown

Replacement Reserve (RR) Analysis: Plan Two - Green

Reserve Funding In Year 20										
Projected replacement reserve balance is <b>\$49,827</b>					This is \$3,114 per unit in inflated dollars or \$1,776 per unit in uninflated dollars					
Projected annual funding to reserves is <b>\$17,807</b>					This is \$1,113 per unit in inflated dollars or \$635 per unit in current dollars					
2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	
Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	
										<b>Reserve Balances (A)</b>
\$92,015	\$91,999	\$89,606	\$85,403	\$77,191	\$73,989	\$64,102	\$52,700	\$53,875	\$48,793	Starting Replacement Reserves
										<b>Annual Funding (B)</b>
\$853	\$879	\$905	\$932	\$960	\$989	\$1,018	\$1,049	\$1,081	\$1,113	Contributions Indexed at 3%
										Additional Unit Contributions <b>(C)</b>
\$13,647	\$14,057	\$14,479	\$14,913	\$15,360	\$15,821	\$16,296	\$16,785	\$17,288	\$17,807	Total Annual Reserve Funding <b>(D)</b>
\$2,965	\$2,971	\$2,905	\$2,786	\$2,546	\$2,457	\$2,167	\$1,833	\$1,876	\$1,731	Interest on Reserves at 3% <b>(E)</b>
<b>\$108,627</b>	<b>\$109,027</b>	<b>\$106,990</b>	<b>\$103,102</b>	<b>\$95,097</b>	<b>\$92,267</b>	<b>\$82,565</b>	<b>\$71,317</b>	<b>\$73,039</b>	<b>\$68,331</b>	<b>Total Funds Available</b>
\$16,628	\$19,421	\$21,587	\$25,911	\$21,108	\$28,165	\$29,865	\$17,442	\$24,246	\$18,504	Total Capital Cost <b>(F)</b>
<b>\$91,999</b>	<b>\$89,606</b>	<b>\$85,403</b>	<b>\$77,191</b>	<b>\$73,989</b>	<b>\$64,102</b>	<b>\$52,700</b>	<b>\$53,875</b>	<b>\$48,793</b>	<b>\$49,827</b>	<b>Reserve Balances (G)</b>
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	



# Projected Capital Needs Over Twenty Years

## SITE SYSTEMS

Replacement Items	Quantity		Cost / Unit in 2013 \$	Total Cost in 2013 \$	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)				Notes
SURFACE												
Parking	10,540	sf	2.10	\$22,134		23	27	4		in	1 Year	Asphalt paved parking areas - fair condition Future resurfacing costs
Parking (Green)	10,540	sf	6.50	\$68,510	\$46,376	23	27					Install pervious pavers
	1,320	sf										Concrete walkways and stairs - fair condition
Pedestrian Paving	198	sf	6.25	\$1,238		23	35	1 /6 /11 /16		in	1 Year	Periodic repair/replacement allowance
	1,320	sf										
Pedestrian Paving (Green)	198	sf	6.25	\$1,238	\$0	23	35	1 /6 /11 /16		in	1 Year	Specify recycled content/Portland cement
Crack-Fill and Sealcoat	10,540	sf	0.35	\$3,689		5	5	1 /9 /14 /19		in	1 Year	Repair allowance
												Chain link fencing - fair to good condition
Fencing	690	lf	16.16	\$11,150		5	15	10		in	1 Year	Future replacement costs
Fencing (Green)	690	lf	21.00	\$14,490	\$3,340	5	25	10		in	1 Year	Install FSC certified wood stockade fencing
Retaining Wall	72	lf				23	15					Concrete block retaining wall - Operating
Retaining Wall (Green)		lf										
												Pole mounted high pressure sodium fixtures (150watt)
Site Lighting	2	ea	2570.00	\$5,140		23	20	1		in	1 Year	Costs to replace
Site Lighting (Green)	2	ea	2762.75	\$5,526	\$386	23	20	1		in	1 Year	Install high eff. LED models (35watt)
Retaining Walls		lf										
Dumpster Enclosures	2	ea	808.00	\$1,616		ADD	20	1		in	1 Year	Costs to add a chain link fence enclosure
Dumpster Enclosures (Green)	2	ea	1050.00	\$2,100	\$484	ADD	25	1		in	1 Year	Costs to add FCS certified wood stockade enclosure
ACCESSIBILITY												
Circulation	1	ls				23	10					Restripe compliant parking spaces w/ 60-inch aisle
Circulation (Green)		ls										
Common Areas	1	ls	450.00	\$450		23	20	1		in	1 Year	Install compliant door hardware @ office Reposition the laundry room equipment
Common Areas (Green)		ea										
Dwelling Units	2	ea				23	20					Dimensions are sufficienct to support barrier free dwelling units.
Dwelling Units (Green)		ea										
Miscellaneous		ls										

Replacement Items	Year 1 2013	Year 2 2014	Year 3 2015	Year 4 2016	Year 5 2017	Year 6 2018	Year 7 2019	Year 8 2020	Year 9 2021	Year 10 2022	Year 11 2023	Year 12 2024	Year 13 2025	Year 14 2026	Year 15 2027	Year 16 2028	Year 17 2029	Year 18 2030	Year 19 2031	Year 20 2032
SURFACE																				
Parking	\$0	\$0	\$0	\$24,186	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Parking (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Pedestrian Paving	\$1,238	\$0	\$0	\$0	\$0	\$1,435	\$0	\$0	\$0	\$0	\$1,663	\$0	\$0	\$0	\$0	\$1,928	\$0	\$0	\$0	\$0
Pedestrian Paving (Green)	\$1,238	\$0	\$0	\$0	\$0	\$1,435	\$0	\$0	\$0	\$0	\$1,663	\$0	\$0	\$0	\$0	\$1,928	\$0	\$0	\$0	\$0
Crack-Fill and Sealcoat	\$3,689	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$4,673	\$0	\$0	\$0	\$0	\$5,417	\$0	\$0	\$0	\$0	\$6,280	\$0
Fencing	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$14,549	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Fencing (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$18,906	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Retaining Wall	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Retaining Wall (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Site Lighting	\$5,140	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Site Lighting (Green)	\$5,526	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Retaining Walls	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Dumpster Enclosures	\$1,616	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Dumpster Enclosures (Green)	\$2,100	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
ACCESSIBILITY																				
Circulation	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Circulation (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Common Areas	\$450	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Common Areas (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Dwelling Units	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Dwelling Units (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Miscellaneous	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Projected Capital Needs Over Twenty Years

MECHANICAL ROOM

Replacement Items	Quantity	Cost / Unit in 2013 \$	Total Cost in 2013 \$	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)			Notes
BOILERS										
Boilers	1 ea	2,713	\$2,713		23	25	2		in 1 Year	Estimated 60MBH - not visually inspected Costs to replace
Boilers (Green)	1 ea	3,794	\$3,794	\$1,081	23	20				Install high efficiency condensing
Boilers	ea									
Boilers (Green)	ea									
Boilers	ea									
Boilers (Green)	ea									
Controls	ea									
Controls (Green)	ea									
Boiler Water Pumps	ea									
Boiler Water Pumps (Green)	ea									
Heating Water Pumps	ea									
Heating Water Pumps (Green)	ea									
Heating Water Pumps	ea									
Heating Water Pumps (Green)	ea									
Flue Exhaust	ea									
Flue Exhaust (Green)	ea									
Condensate & Feed Water	ea									
Miscellaneous	ea									
Miscellaneous (Green)	ea									
Miscellaneous	ea									
Miscellaneous (Green)	ea									

Costs projected at 3%

Replacement Items	Year 1 2013	Year 2 2014	Year 3 2015	Year 4 2016	Year 5 2017	Year 6 2018	Year 7 2019	Year 8 2020	Year 9 2021	Year 10 2022	Year 11 2023	Year 12 2024	Year 13 2025	Year 14 2026	Year 15 2027	Year 16 2028	Year 17 2029	Year 18 2030	Year 19 2031	Year 20 2032
BOILERS																				
Boilers	\$0	\$2,794	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Boilers (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Boilers	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Boilers (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Boilers	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Boilers (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Controls	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Controls (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Boiler Water Pumps	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Boiler Water Pumps (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Heating Water Pumps	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Heating Water Pumps (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Heating Water Pumps	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Heating Water Pumps (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Flue Exhaust	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Flue Exhaust (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Condensate & Feed Water	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Miscellaneous	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Miscellaneous (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Miscellaneous	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Miscellaneous (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Projected Capital Needs Over Twenty Years

MECHANICAL ROOM--continued

Replacement Items	Quantity	Cost / Unit in 2013 \$	Total Cost in 2013 \$	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)		Notes
BOILER ROOM SYSTEMS									
Boiler Room Piping/Valves	ea								
Boiler Room Piping/Valves (Green)	ea								
3-Way Valve & Controller	ea								
3-Way Valve & Controller (Green)	ea								
Heat Exchanger	ea								
Heat Exchanger (Green)	ea								
DHW Generation	ea								
DHW Generation (Green)	ea								
DHW Generation	ea								
DHW Generation (Green)	ea								
DHW Storage	1 ea	1350.00	\$1,350		23	20	1	in 1 Year	40 gallon indirect storage tank - not visually inspected Costs to replace
DHW Storage (Green)	ea								
DHW Storage	ea								
DHW Storage (Green)	ea								
Domestic Hot Water Pumps	ea								
Domestic Hot Water Pumps (Green)	ea								
Domestic Hot Water Pumps	ea								
Domestic Hot Water Pumps (Green)	ea								
Miscellaneous	ea								
Miscellaneous (Green)	ea								
Miscellaneous	ea								

**Liberty Hall Apartments**  
**MECHANICAL ROOM--continued**

*Costs projected at 3%*

Replacement Items	Year 1 2013	Year 2 2014	Year 3 2015	Year 4 2016	Year 5 2017	Year 6 2018	Year 7 2019	Year 8 2020	Year 9 2021	Year 10 2022	Year 11 2023	Year 12 2024	Year 13 2025	Year 14 2026	Year 15 2027	Year 16 2028	Year 17 2029	Year 18 2030	Year 19 2031	Year 20 2032
<b>BOILER ROOM SYSTEMS</b>																				
Boiler Room Piping/Valves	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Boiler Room Piping/Valves (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3-Way Valve & Controller	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3-Way Valve & Controller (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Heat Exchanger	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Heat Exchanger (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
DHW Generation	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
DHW Generation (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
DHW Generation	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
DHW Generation (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
DHW Storage	\$1,350	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
DHW Storage (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
DHW Storage	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
DHW Storage (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Domestic Hot Water Pumps	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Domestic Hot Water Pumps (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Domestic Hot Water Pumps	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Domestic Hot Water Pumps (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Miscellaneous	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Miscellaneous (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Miscellaneous	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

# Projected Capital Needs Over Twenty Years

## BUILDING MECHANICAL AND ELECTRICAL

Replacement Items	Quantity		Cost / Unit in 2013 \$	Total Cost in 2013 \$	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)		Notes
BUILDING MECHANICAL										
Compactors		ea								
Building Fire Suppression	1	ls				23	35			dwelling units and common areas feature full sprinkler coverage, city pressure - Monitor
Building Distribution Systems		ls								
Building HVAC Systems		ea								
Building HVAC Systems (Green)		ea								
Building HVAC Systems		ea								
Building HVAC Systems (Green)		ea								
Building HVAC Systems		ea								
Building HVAC Systems (Green)		ea								
Building Vent. & Exhaust		ea								
Building Vent. & Exhaust (Green)		ea								
Cold Water Booster Pumps		ea								
Cold Water Booster Pumps (Green)		ea								
BUILDING ELECTRICAL										
Building Power Wiring	1	ls				23	99			Monitor
Emergency Generator		ea								Battery powered emergency lighting
Emergency Lights	3	ea				23	10			Operating
Smoke / Fire Detection		ls								
Signaling / Communication		ls								
BUILDING ELEVATORS										
Shafts and Doorways		ea								
Cabs		ea								
Controller/Dispatcher		ea								
Machine Room Equipment		ea								

## BUILDING MECHANICAL AND ELECTRICAL

Costs projected at 3%

Replacement Items	Year 1 2013	Year 2 2014	Year 3 2015	Year 4 2016	Year 5 2017	Year 6 2018	Year 7 2019	Year 8 2020	Year 9 2021	Year 10 2022	Year 11 2023	Year 12 2024	Year 13 2025	Year 14 2026	Year 15 2027	Year 16 2028	Year 17 2029	Year 18 2030	Year 19 2031	Year 20 2032
<b>BUILDING MECHANICAL</b>																				
Compactors	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Building Fire Suppression	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Building Distribution Systems	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Building HVAC Systems	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Building HVAC Systems (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Building HVAC Systems	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Building HVAC Systems (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Building HVAC Systems	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Building HVAC Systems (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Building Vent. & Exhaust	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Building Vent. & Exhaust (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Cold Water Booster Pumps	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Cold Water Booster Pumps (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
<b>BUILDING ELECTRICAL</b>																				
Building Power Wiring	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Emergency Generator	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Emergency Lights	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Smoke / Fire Detection	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Signaling / Communication	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Shafts and Doorways	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Cabs	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Controller/Dispatcher	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Machine Room Equipment	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0



# Projected Capital Needs Over Twenty Years

## BUILDING ARCHITECTURE

Replacement Items	Quantity		Cost / Unit in 2013 \$	Total Cost in 2013 \$	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)				Notes
STRUCTURE												
Foundation	662	lf				23	50					Concrete foundation Monitor
Framing	1	ls				23	70					Monitor
Slab		sf										
Miscellaneous		ea										
BUILDING EXTERIOR												
Exterior Common Doors	4	ea	345.00	\$1,380		23	35	12		in	1 Year	Insulated metal doors - good to fair condition Future replacement costs
Exterior Common Doors (Green)		ea										
Exterior Unit Doors - 2	15	ea	345.00	\$5,175		23	35	12		over	4 Years	Insulated metal doors - good to fair condition Future replacement costs
Exterior Unit Doors - 2 (Green)		ea										
Glass Sliding Doors		ea										
Glass Sliding Doors (Green)		ea										
Service Doors	1	ea	515.00	\$515		23	30	7		in	1 Year	Service door to basement boiler room - good condition Costs to replace
Storm Doors	19	ea	247.00	\$4,693		23	15	1 16		over	6 Years	Costs to replace
	7,298	sf										Faux brick EFIS - isolated impact damage, difficult repair
Exterior Walls - Faux Brick	547	sf	4.55	\$2,490		23	25	1 5 9 13 17		in	1 Year	Costs to continue spot repairs
Exterior Walls - Faux Brick (Green)	7,298	sf	8.50	\$62,033	\$59,543	23	30					Install hardie (cement) siding
Exterior Walls - Fiber Board	9,108	sf	0.95	\$8,653		23	15	10		in	1 Year	Paint hardie (cement) siding
Exterior Walls - Fiber Board (Green)	9,108	sf	0.95	\$8,653	\$0	23	15	10		in	1 Year	Specify low VOC paint
Exterior Walls		sf										
Trim, Soffit, Fascia		lf										
Trim, Soffit, Fascia (Green)		lf										
Exterior Ceilings		sf										
Miscellaneous		ea										
Miscellaneous (Green)		ea										

Costs projected at 3%

Replacement Items	Year 1 2013	Year 2 2014	Year 3 2015	Year 4 2016	Year 5 2017	Year 6 2018	Year 7 2019	Year 8 2020	Year 9 2021	Year 10 2022	Year 11 2023	Year 12 2024	Year 13 2025	Year 14 2026	Year 15 2027	Year 16 2028	Year 17 2029	Year 18 2030	Year 19 2031	Year 20 2032
STRUCTURE																				
Foundation	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Framing	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Slab	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Miscellaneous	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
BUILDING EXTERIOR																				
Exterior Common Doors	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,910	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Exterior Common Doors (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Exterior Unit Doors - 2	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,791	\$1,845	\$1,900	\$1,957	\$0	\$0	\$0	\$0	\$0
Exterior Unit Doors - 2 (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Glass Sliding Doors	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Glass Sliding Doors (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Service Doors	\$0	\$0	\$0	\$0	\$0	\$0	\$615	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Storm Doors	\$782	\$806	\$830	\$855	\$880	\$907	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,219	\$1,255	\$1,293	\$1,332	\$1,372
Exterior Walls - Faux Brick	\$2,490	\$0	\$0	\$0	\$2,803	\$0	\$0	\$0	\$3,155	\$0	\$0	\$0	\$3,551	\$0	\$0	\$0	\$3,996	\$0	\$0	\$0
Exterior Walls - Faux Brick (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Exterior Walls - Fiber Board	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$11,290	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Exterior Walls - Fiber Board (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$11,290	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Exterior Walls	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Trim, Soffit, Fascia	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Trim, Soffit, Fascia (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Exterior Ceilings	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Miscellaneous	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Miscellaneous (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

# Projected Capital Needs Over Twenty Years

## BUILDING ARCHITECTURE--*continued*

Replacement Items	Quantity		Cost / Unit in 2013 \$	Total Cost in 2013 \$	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)			Notes
BUILDING EXTERIORS (cont.)											
Windows	50	ea	745.00	\$37,250		23	30	7		in 1 Year	Double wide, single pane, wood tramed windows Costs to replace with vinyl framed double pane models
Windows (Green)		ea									
Windows	27	ea	355.00	\$9,585		23	30	7		in 1 Year	Single pane, wood framed windows Costs to replace with vinyl framed double pane models
Windows (Green)		ea									
Windows - Office	2	ea	355.00	\$710		23	30	7		in 1 Year	Single pane windows to office Replace with code compliant double pane models
Windows - Office (Green)	2	ea	381.63	\$763	\$53	23	30	7		in 1 Year	Costs to install high eff. Fiberglass framed windows
Window Lintels		ea									
Unit Balconies		ea									
Unit Balconies (Green)		ea									
Unit Patios		ea									
Unit Patios (Green)		ea									
Building Mounted Lighting	13	ea	465.00	\$6,045		varies	15	1 16		over 5 Years	Five - 50watt HPS and eight 150watt HPS Costs to replace as needed
Building Mounted Lighting (Green)	13	ea	499.88	\$6,498	\$453	varies	15	1 16		over 5 Years	Install LED models
ROOF SYSTEMS											
Structure	6,849	sf				23	50				wood roof traming Monitor
Roof Covering	7,945	sf	4.00	\$31,779		23	20	1		in 1 Year	Asphalt shingles - poor overall condition, storm damage Costs to replace
Roof Covering (Green)	7,945	sf	9.50	\$75,478	\$43,698	23	50				Install a metal tile roof system
Roof Covering	382	sf				23	20				Fiberglass office attic insulation Operating
Roof Covering (Green)	382	sf	1.77	\$676	\$676	23	20				Add 7 - inches of blown in cellulose
Roof Covering		sf									
Skylights		ea									
Penthouses		ea									

Costs projected at 3%

Replacement Items	Year 1 2013	Year 2 2014	Year 3 2015	Year 4 2016	Year 5 2017	Year 6 2018	Year 7 2019	Year 8 2020	Year 9 2021	Year 10 2022	Year 11 2023	Year 12 2024	Year 13 2025	Year 14 2026	Year 15 2027	Year 16 2028	Year 17 2029	Year 18 2030	Year 19 2031	Year 20 2032
BUILDING EXTERIORS (cont.)																				
Windows	\$0	\$0	\$0	\$0	\$0	\$0	\$44,478	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Windows (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Windows	\$0	\$0	\$0	\$0	\$0	\$0	\$11,445	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Windows (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Windows - Office	\$0	\$0	\$0	\$0	\$0	\$0	\$848	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Windows - Office (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$911	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Window Lintels	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Balconies	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Balconies (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Patios	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Patios (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Building Mounted Lighting	\$1,209	\$1,245	\$1,283	\$1,321	\$1,361	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,884	\$1,940	\$1,998	\$2,058	\$2,120
Building Mounted Lighting (Green)	\$1,300	\$1,339	\$1,379	\$1,420	\$1,463	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2,025	\$2,086	\$2,148	\$2,213	\$2,279
ROOF SYSTEMS																				
Structure	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Roof Covering	\$31,779	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Roof Covering (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Roof Covering	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Roof Covering (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Roof Covering	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Skylights	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Penthouses	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

# Projected Capital Needs Over Twenty Years

## BUILDING ARCHITECTURE--*continued*

Replacement Items	Quantity		Cost / Unit in 2013 \$	Total Cost in 2013 \$	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)				Notes
HALLS												
Hallway Walls and Ceilings	332	sf	0.62	\$206		23	10	1	11		in 1 Year	Painted walls and ceiling Costs to paint
Hallway Walls and Ceilings (Green)	332	sf	0.62	\$206	\$0	23	10	1	11		in 1 Year	Specify low VOC paint
Hallway Floors	60	sf	5.00	\$300		23	15	1	16		in 1 Year	VCT flooring - poor overall condition Costs to replace
Hallway Floors (Green)	60	sf	5.38	\$323	\$23	23	25	1			in 1 Year	Install natural linoleum products
Hallway Floors		sf										
Hallway Floors (Green)		sf										
Hallway Interior Lighting		ea										
Hallway Interior Lighting (Green)		ea										
Hallway Heating		ea										
Hallway Heating (Green)		ea										
Hallway Doors		ea										
Miscellaneous		ea										
Miscellaneous (Green)		ea										
STAIRS												
Stair Walls and Ceilings	874	sf	0.62	\$542		23	10	1	11		in 1 Year	Painted walls and ceilings Costs to paint
Stair Walls and Ceilings (Green)	874	sf	0.62	\$542	\$0	23	10	1	11		in 1 Year	Specify low VOC paint
Stair Floors	25	sf	47.10	\$1,178		23	25	2			in 1 Year	Rubber stair treads Costs to replace
Stair Floors (Green)		sf										
Stair Interior Lighting		ea										
Stair Interior Lighting (Green)		ea										
Stair Doors		ea										
Stair Railings		ea										

Costs projected at 3%

Replacement Items	Year 1 2013	Year 2 2014	Year 3 2015	Year 4 2016	Year 5 2017	Year 6 2018	Year 7 2019	Year 8 2020	Year 9 2021	Year 10 2022	Year 11 2023	Year 12 2024	Year 13 2025	Year 14 2026	Year 15 2027	Year 16 2028	Year 17 2029	Year 18 2030	Year 19 2031	Year 20 2032
-------------------	----------------	----------------	----------------	----------------	----------------	----------------	----------------	----------------	----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------

HALLS

Hallway Walls and Ceilings	\$206	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$277	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Hallway Walls and Ceilings (Green)	\$206	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$277	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Hallway Floors	\$300	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$467	\$0	\$0	\$0	\$0
Hallway Floors (Green)	\$323	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Hallway Floors	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Hallway Floors (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Hallway Interior Lighting	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Hallway Interior Lighting (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Hallway Heating	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Hallway Heating (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Hallway Doors	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Miscellaneous	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Miscellaneous (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

STAIRS

Stair Walls and Ceilings	\$542	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$728	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Stair Walls and Ceilings (Green)	\$542	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$728	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Stair Floors	\$0	\$1,213	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Stair Floors (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Stair Interior Lighting	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Stair Interior Lighting (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Stair Doors	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Stair Railings	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

# Projected Capital Needs Over Twenty Years

## BUILDING ARCHITECTURE--*continued*

Replacement Items	Quantity	Cost / Unit in 2013 \$	Total Cost in 2013 \$	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)				Notes
LOBBIES / MAIL FACILITIES											
Lobby Walls & Ceilings	sf										
Lobby Walls & Ceilings (Green)	sf										
Lobby Floors	sf										
Lobby Floors (Green)	sf										
OFFICE											
Walls and Ceilings	768 sf	0.62	\$476		23	10	1	11	in	1 Year	Painted walls and ceilings Costs to paint
Walls and Ceilings (Green)	768 sf	0.62	\$476	\$0	23	10	1	11	in	1 Year	Specify low VOC paint
Floor Covering	224 sf	5.00	\$1,120		23	15	1	16	in	1 Year	VCT floor covering - fair condition Costs to replace
Floor Covering (Green)	224 sf	5.38	\$1,204	\$84	23	25	1		in	1 Year	Install natural linoleum flooring
Office Appliances	1 ea	670.00	\$670		15	15	1	16	in	1 Year	Kenmore refrigerator, not Energy Star Costs to replace
Office Appliances (Green)	1 ea	720.25	\$720	\$50	15	15	1	16	in	1 Year	Replace with Energy Star refrigerator
Office/Common Area Lightng	1 ls				23	20					12x - 34watt 4'fluor. Office/laundry -8hour/day Halls/stairs - 5x cfl 15w on 24/7
Office/Common Area Lightng (Green)	1 ls	990.00	\$990	\$990	23	20	1		in	1 Year	Install LED lamps
PUBLIC LAUNDRY											
Walls and Ceilings	392 sf	0.62	\$243		23	10	1	11	in	1 Year	Painted walls and ceilings Costs to paint
Walls and Ceilings (Green)	392 sf	0.62	\$243	\$0	23	10	1	11	in	1 Year	Specify low VOC paint
Floor Covering	88 sf	5.00	\$440		23	15	1	16	in	1 Year	VCT flooring Costs to replace
Floor Covering (Green)	88 sf	5.38	\$473	\$33	23	25	1		in	1 Year	Install linoleum flooring
Laundry Equipment	4 ea				23	12					Two washers (not Energy Star), Two dryers Leased equipment
Laundry Equipment (Green)	4 ea				23	12					Request Energy Star washers from vender
Restroom Fixtures / Accessories	ea										
Miscellaneous	ea										
Miscellaneous (Green)	ea										

Costs projected at 3%

Replacement Items	Year 1 2013	Year 2 2014	Year 3 2015	Year 4 2016	Year 5 2017	Year 6 2018	Year 7 2019	Year 8 2020	Year 9 2021	Year 10 2022	Year 11 2023	Year 12 2024	Year 13 2025	Year 14 2026	Year 15 2027	Year 16 2028	Year 17 2029	Year 18 2030	Year 19 2031	Year 20 2032
<b>LOBBIES / MAIL FACILITIES</b>																				
Lobby Walls & Ceilings	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Lobby Walls & Ceilings (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Lobby Floors	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Lobby Floors (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
<b>OFFICE</b>																				
Walls and Ceilings	\$476	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$640	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Walls and Ceilings (Green)	\$476	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$640	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Floor Covering	\$1,120	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,745	\$0	\$0	\$0	\$0
Floor Covering (Green)	\$1,204	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Office Appliances	\$670	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,044	\$0	\$0	\$0	\$0
Office Appliances (Green)	\$720	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,122	\$0	\$0	\$0	\$0
Office/Common Area Lightng	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Office/Common Area Lighting (Green)	\$990	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
<b>PUBLIC LAUNDRY</b>																				
Walls and Ceilings	\$243	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$327	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Walls and Ceilings (Green)	\$243	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$327	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Floor Covering	\$440	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$686	\$0	\$0	\$0	\$0
Floor Covering (Green)	\$473	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Laundry Equipment	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Laundry Equipment (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Restroom Fixtures / Accessories	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Miscellaneous	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Miscellaneous (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0



# Projected Capital Needs Over Twenty Years

## DWELLING UNITS

Replacement Items	Quantity		Cost / Unit 2013.00	Total Cost in 2013 \$	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)		Notes
LIVING AREA FINISHES										
Unit Hallway Doors	3	ea	420.00	\$1,260		23	30	7	over 3 Years	Metal hallway doors Future replacement costs
Unit Interior Doors	47	ea				23	25			Hollow core interior passage doors Operating
Unit Closet Doors	63	ea	326.20	\$20,551		23	25	1	over 20 Years	Hung and bi-fold closet doors Replace as needed
Unit Walls and Ceilings	49,878	sf				23	5			Painted walls and ceiling Operating
Unit Walls and Ceilings (Green)		sf								Specify low VOC paint
Living Area Floors	10,363	sf	5.00	\$51,815		<1	15	16	over 6 Year	VCT floor - mostly original
	9,391	sf	5.00	\$46,957		23	15	1	over 4 Years	Costs to replace as needed
Living Area Floors (Green)	10,363	sf	5.38	\$55,701	\$8,744	23	25	1	over 4 Years	Install linoleum flooring
Living Area Floors		sf				0	15			
Living Area Floors (Green)		sf								
BATHROOMS										
Bathroom Floors	975	sf				23	35			Ceramic tile flooring - original to development Operating
Bathroom Floors (Green)		sf								
Bathtub and Shower	16	ea	1720.00	\$27,520		23	25	2	over 16 Years	Fiberglass tubs and surrounds - fair condition Costs to replace as needed
	16	ea	18.50	\$296		23	25	1	in 1 Year	
Bathtub and Shower (Green)	16	ea	1720.00	\$27,520	\$0	23	25	2	over 16 Years	Replace tubs and add 1.7gpm showerheads
Bathroom Vanity	19	ea	410.00	\$7,790		23	25	2	over 4 Years	Plywood vanities Costs to replace
Bathroom Vanity (Green)	19	ea	440.75	\$8,374	\$584	23	25			FSC certified wood
Bathroom Sinks		ea								
	19	ttl				23				1.6 gpf models, some new dual flush models
Bathroom Toilets	16	ea	420.00	\$6,720		23	25	2	over 6 Years	Costs to replace
	19	ttl				23				
Bathroom Toilets (Green)	16	ea	451.50	\$7,224	\$504	23	25	2	over 6 Years	Install 1.28 gpf models
Ventilation & Exhaust	19	ea	150.00	\$2,850		23	25	2	over 6 Years	Costs to replace exhaust fans
Ventilation & Exhaust (Green)	19	ea	161.25	\$3,064	\$214	23	25	2	over 6 Years	Install humidistat controlled exhaust fans
Accessories	19	ea				23	10			Operating

Costs projected at 3%

Replacement Items	Year 1 2013	Year 2 2014	Year 3 2015	Year 4 2016	Year 5 2017	Year 6 2018	Year 7 2019	Year 8 2020	Year 9 2021	Year 10 2022	Year 11 2023	Year 12 2024	Year 13 2025	Year 14 2026	Year 15 2027	Year 16 2028	Year 17 2029	Year 18 2030	Year 19 2031	Year 20 2032
LIVING AREA FINISHES																				
Unit Hallway Doors	\$0	\$0	\$0	\$0	\$0	\$0	\$502	\$517	\$532	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Interior Doors	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Closet Doors	\$1,028	\$1,058	\$1,090	\$1,123	\$1,156	\$1,191	\$1,227	\$1,264	\$1,302	\$1,341	\$1,381	\$1,422	\$1,465	\$1,509	\$1,554	\$1,601	\$1,649	\$1,698	\$1,749	\$1,802
Unit Walls and Ceilings	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Walls and Ceilings (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Living Area Floors	\$11,739	\$12,092	\$12,454	\$12,828	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$13,454	\$13,858	\$14,274	\$14,702	\$15,143
Living Area Floors (Green)	\$13,925	\$14,343	\$14,773	\$15,217	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Living Area Floors	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Living Area Floors (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
BATHROOMS																				
Bathroom Floors	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Bathroom Floors (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Bathtub and Shower	\$0	\$1,772	\$1,825	\$1,879	\$1,936	\$1,994	\$2,054	\$2,115	\$2,179	\$2,244	\$2,312	\$2,381	\$2,452	\$2,526	\$2,602	\$2,680	\$2,760	\$0	\$0	\$0
Bathtub and Shower (Green)	\$296	\$1,772	\$1,825	\$1,879	\$1,936	\$1,994	\$2,054	\$2,115	\$2,179	\$2,244	\$2,312	\$2,381	\$2,452	\$2,526	\$2,602	\$2,680	\$2,760	\$0	\$0	\$0
Bathroom Vanity	\$0	\$2,006	\$2,066	\$2,128	\$2,192	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Bathroom Vanity (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Bathroom Sinks	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Bathroom Toilets	\$0	\$1,154	\$1,188	\$1,224	\$1,261	\$1,298	\$1,337	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Bathroom Toilets (Green)	\$0	\$1,240	\$1,277	\$1,316	\$1,355	\$1,396	\$1,438	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ventilation & Exhaust	\$0	\$489	\$504	\$519	\$535	\$551	\$567	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ventilation & Exhaust (Green)	\$0	\$526	\$542	\$558	\$575	\$592	\$610	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Accessories	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

# Projected Capital Needs Over Twenty Years

## DWELLING UNITS--*continued*

Replacement Items	Quantity		Cost / Unit in 2013 \$	Total Cost in 2013 \$	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)				Notes
KITCHENS												
Kitchen Floors	1,205	sf	5.00	\$6,024		23	15	1	16	over 5 Years	VCT Flooring - most original Costs to replace as needed	
Kitchen Floors (Green)	1,205	sf	5.38	\$6,477	\$453	23	15	1	16	over 5 Years	Install natural linoleum flooring	
Kitchen Cabinets	16	ea	3600.00	\$57,600		23	25	2		over 6 Years	Plywood cabinets - fair to poor condition Cost to replace	
Kitchen Cabinets (Green)	16	ea	3870.00	\$61,920	\$4,320	23	25				Install FSC certified wood cabinets	
Kitchen Cabinets		ea										
Kitchen Cabinets (Green)		ea										
Kitchen Countertops	16	ea	632.96	\$10,127		23	10	12		over 6 Years	Laminated particleboard countertops Future replacement costs	
Kitchen Countertops (Green)	16	ea	1350.00	\$21,600	\$11,473	23	35				Costs to install solid surface recycled paper countertops	
Range	10	ea	435.00	\$4,350		23	20	1		over 4 Years	30-inch electric ranges Costs to replace	
Range (Green)		ea										
Range	6	ea	435.00	\$2,610		>6	20	14		over 2 Years	30-inch electric ranges Costs to replace	
Range (Green)		ea										
Refrigerator	16	ea	670.00	\$10,720		varies	15	1	16	over 10 Years	Frost-free, 14 cf models Costs to replace as needed	
Refrigerator (Green)		ea									Consider Energy Star replacements	
Refrigerator		ea										
Refrigerator (Green)		ea										
Dishwasher		ea										
Dishwasher (Green)		ea										
Rangehood and Vent	16	ea	281.00	\$4,496		23	20	2		over 6 Years	Replace rangehoods concurrent with cabinetry	
Disposals		ea										
Miscellaneous		ea										
Miscellaneous (Green)		ea										

**Liberty Hall Apartments**  
**DWELLING UNITS--continued**

*Costs projected at 3%*

Replacement Items	Year 1 2013	Year 2 2014	Year 3 2015	Year 4 2016	Year 5 2017	Year 6 2018	Year 7 2019	Year 8 2020	Year 9 2021	Year 10 2022	Year 11 2023	Year 12 2024	Year 13 2025	Year 14 2026	Year 15 2027	Year 16 2028	Year 17 2029	Year 18 2030	Year 19 2031	Year 20 2032
<b>KITCHENS</b>																				
Kitchen Floors	\$1,205	\$1,241	\$1,278	\$1,316	\$1,356	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,877	\$1,933	\$1,991	\$2,051	\$2,113
Kitchen Floors (Green)	\$1,295	\$1,334	\$1,374	\$1,415	\$1,458	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2,018	\$2,079	\$2,141	\$2,205	\$2,271
Kitchen Cabinets	\$0	\$9,888	\$10,185	\$10,490	\$10,805	\$11,129	\$11,463	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Kitchen Cabinets (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Kitchen Cabinets	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Kitchen Cabinets (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Kitchen Countertops	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2,336	\$2,407	\$2,479	\$2,553	\$2,630	\$2,709	\$0	\$0	\$0
Kitchen Countertops (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Range	\$1,088	\$1,120	\$1,154	\$1,188	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Range (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Range	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,916	\$1,974	\$0	\$0	\$0	\$0	\$0
Range (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Refrigerator	\$1,072	\$1,104	\$1,137	\$1,171	\$1,207	\$1,243	\$1,280	\$1,318	\$1,358	\$1,399	\$0	\$0	\$0	\$0	\$0	\$1,670	\$1,720	\$1,772	\$1,825	\$1,880
Refrigerator (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Refrigerator	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Refrigerator (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Dishwasher	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Dishwasher (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Rangehood and Vent	\$0	\$772	\$795	\$819	\$843	\$869	\$895	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Disposals	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Miscellaneous	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Miscellaneous (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

# Projected Capital Needs Over Twenty Years

## DWELLING UNITS--*continued*

Replacement Items	Quantity		Cost / Unit in 2013 \$	Total Cost in 2013 \$	Total Premium	AGE (Years)	EUL (Years)	Replacement Schedule (Year of action AND duration of project)			Notes
IN-UNIT MECHANICAL											
	16	tll									Natural gas-fired boilers, 70MBH
Boilers	12	ea	2712.50	\$32,550		23	25	1	over 3 Years		Costs to replace
Boilers (Green)		ea									Consider high eff. condensing boiler replacements
Unit Thermostats	30	ea	105.00	\$3,150		varies	15	1 16	over 10 Years		Wall mounted thermostats
Unit Thermostats (Green)		ea									Costs to replace as needed
Unit Air Conditioning		lf									
Unit Air Conditioning (Green)		lf									
Unit Radiation	1,449	lf	27.50	\$39,848		23	30	1	over 20 Years		Hydraunic baseboard
Unit Radiation (Green)		lf									Costs to replace radiator covers
Unit Domestic Hot Water	16	ea	1350.00	\$21,600		varies	15	8	over 10 Years		40-gallon in-direct hot water storage tanks
	13	ea	1350.00	\$17,550		23	15	1	over 3 Years		Costs to replace the remaining original tanks
Unit Domestic Hot Water (Green)		ea									
Miscellaneous		ea									
Miscellaneous (Green)		ea									
IN-UNIT ELECTRICAL											
Unit Electrical Panel	16	ea				23	50				No problems observed or reported
											Monitor
Carbon Monoxide Detection	30	ea	190.00	\$5,700		varies	7	1 8 15	over 7 Years		Costs to replace carbon monoxide detectors as needed
	72		190.00	\$13,680		varies	7	8 15	over 7 Years		Future replacement for all smoke detectors
Unit Smoke/Fire Detection	44	ea	190.00	\$8,360		varies	7	1	over 7 Years		Costs to replace existing smokes as needed
Unit Smoke/Fire Detection	28	ea	295.00	\$8,260		varies	7	1	in 1 Year		Costs to add bedroom smoke detectors
Unit Lighting		lf									
Unit Lighting (Green)		lf									
Unit Lighting		ea									
Unit Lighting (Green)		ea									
Miscellaneous		ea									

Costs projected at 3%

Replacement Items	Year 1 2013	Year 2 2014	Year 3 2015	Year 4 2016	Year 5 2017	Year 6 2018	Year 7 2019	Year 8 2020	Year 9 2021	Year 10 2022	Year 11 2023	Year 12 2024	Year 13 2025	Year 14 2026	Year 15 2027	Year 16 2028	Year 17 2029	Year 18 2030	Year 19 2031	Year 20 2032
-------------------	----------------	----------------	----------------	----------------	----------------	----------------	----------------	----------------	----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------

IN-UNIT MECHANICAL

Boilers	\$10,850	\$11,176	\$11,511	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Boilers (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Thermostats	\$315	\$324	\$334	\$344	\$355	\$365	\$376	\$387	\$399	\$411	\$0	\$0	\$0	\$0	\$0	\$491	\$505	\$521	\$536	\$552
Unit Thermostats (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Air Conditioning	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Air Conditioning (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Radiation	\$1,992	\$2,052	\$2,114	\$2,177	\$2,242	\$2,310	\$2,379	\$2,450	\$2,524	\$2,600	\$2,678	\$2,758	\$2,841	\$2,926	\$3,014	\$3,104	\$3,197	\$3,293	\$3,392	\$3,494
Unit Radiation (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Domestic Hot Water	\$5,850	\$6,026	\$6,206	\$0	\$0	\$0	\$0	\$2,657	\$2,736	\$2,818	\$2,903	\$2,990	\$3,080	\$3,172	\$3,267	\$3,365	\$3,466	\$0	\$0	\$0
Unit Domestic Hot Water (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Miscellaneous	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Miscellaneous (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

IN-UNIT ELECTRICAL

Unit Electrical Panel	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Carbon Monoxide Detection	\$814	\$839	\$864	\$890	\$916	\$944	\$972	\$1,001	\$1,032	\$1,062	\$1,094	\$1,127	\$1,161	\$1,196	\$1,232	\$1,269	\$1,307	\$1,346	\$1,386	\$1,428
Unit Smoke/Fire Detection	\$1,194	\$1,230	\$1,267	\$1,305	\$1,344	\$1,385	\$1,426	\$2,404	\$2,476	\$2,550	\$2,626	\$2,705	\$2,786	\$2,870	\$2,956	\$3,045	\$3,136	\$3,230	\$3,327	\$3,427
Unit Smoke/Fire Detection	\$8,260	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Lighting	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Lighting (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Lighting	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Unit Lighting (Green)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Miscellaneous	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

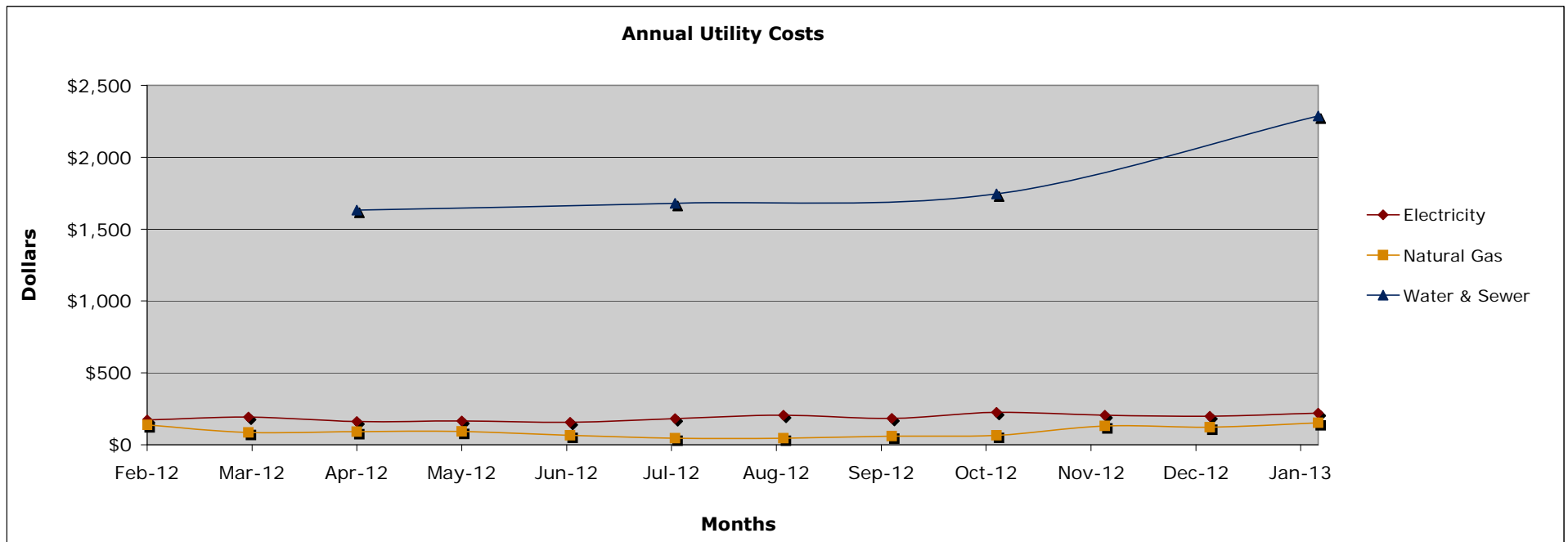
# Energy Analysis

## Utility Usage

### Liberty Hall Apartments

The energy analysis portion of this GCNA examines utility bills for the most recent 12 months to summarize at electricity, natural gas, and water/sewer use. The following table and charts show the utility information by utility source, and by mon

	ELECTRICITY		NATURAL GAS		WATER / SEWER			OIL		TOTAL
	kWh	\$	Therms	\$	Gallons	Water \$	Sewer \$	Total \$	Gallons	\$
Jan-13	1,311	\$219	105	\$152	253,589	\$0	\$0	\$2,288		<b>\$2,660</b>
Dec-12	1,163	\$198	81	\$122						<b>\$320</b>
Nov-12	1,222	\$206	90	\$131						<b>\$337</b>
Oct-12	1,360	\$226	37	\$66	231,147	\$0	\$0	\$1,745		<b>\$2,037</b>
Sep-12	1,069	\$185	31	\$60						<b>\$244</b>
Aug-12	1,219	\$206	22	\$46						<b>\$252</b>
Jul-12	1,049	\$182	20	\$45	210,202	\$0	\$0	\$1,680		<b>\$1,907</b>
Jun-12	881	\$157	37	\$66						<b>\$223</b>
May-12	968	\$166	59	\$94						<b>\$259</b>
Apr-12	935	\$161	56	\$92	167,563	\$0	\$0	\$1,633		<b>\$1,886</b>
Mar-12	1,159	\$192	54	\$86						<b>\$278</b>
Feb-12	1,027	\$173	102	\$139						<b>\$312</b>
<b>Total</b>	<b>13,363</b>	<b>\$2,271</b>	<b>695</b>	<b>\$1,098</b>	<b>862,502</b>	<b>\$0</b>	<b>\$0</b>	<b>\$7,346</b>		<b>\$10,715</b>
<i>Unit Cost</i>		<i>\$0.170</i>		<i>\$1.5807</i>				<i>\$0.00852</i>		



\* June gas usage was estimated using available billing information

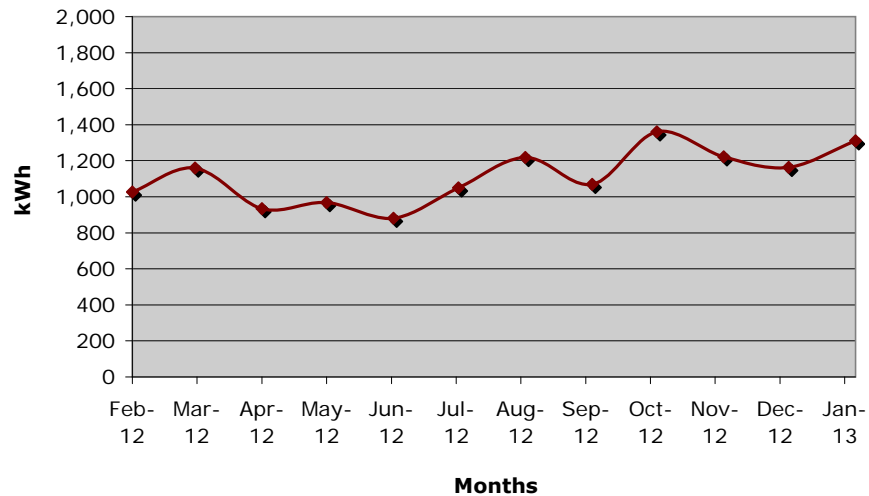
# Energy Analysis

## Utility Usage, By Type

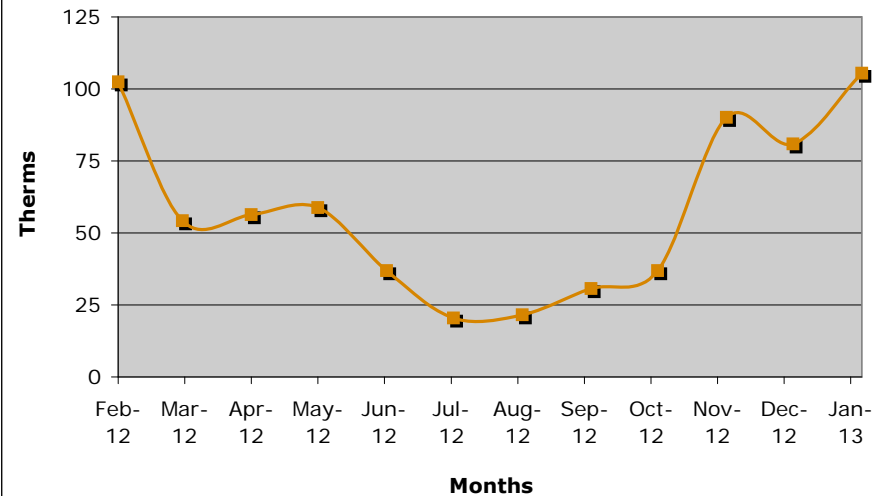
### Liberty Hall Apartments

Below are graphic presentations of annual usage by utility type for the property.

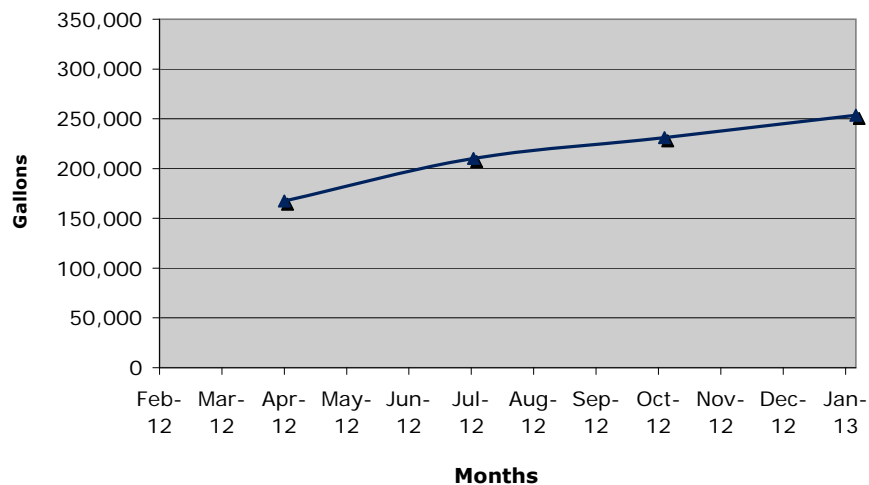
**Electricity**



**Natural Gas**



**Water & Sewer**



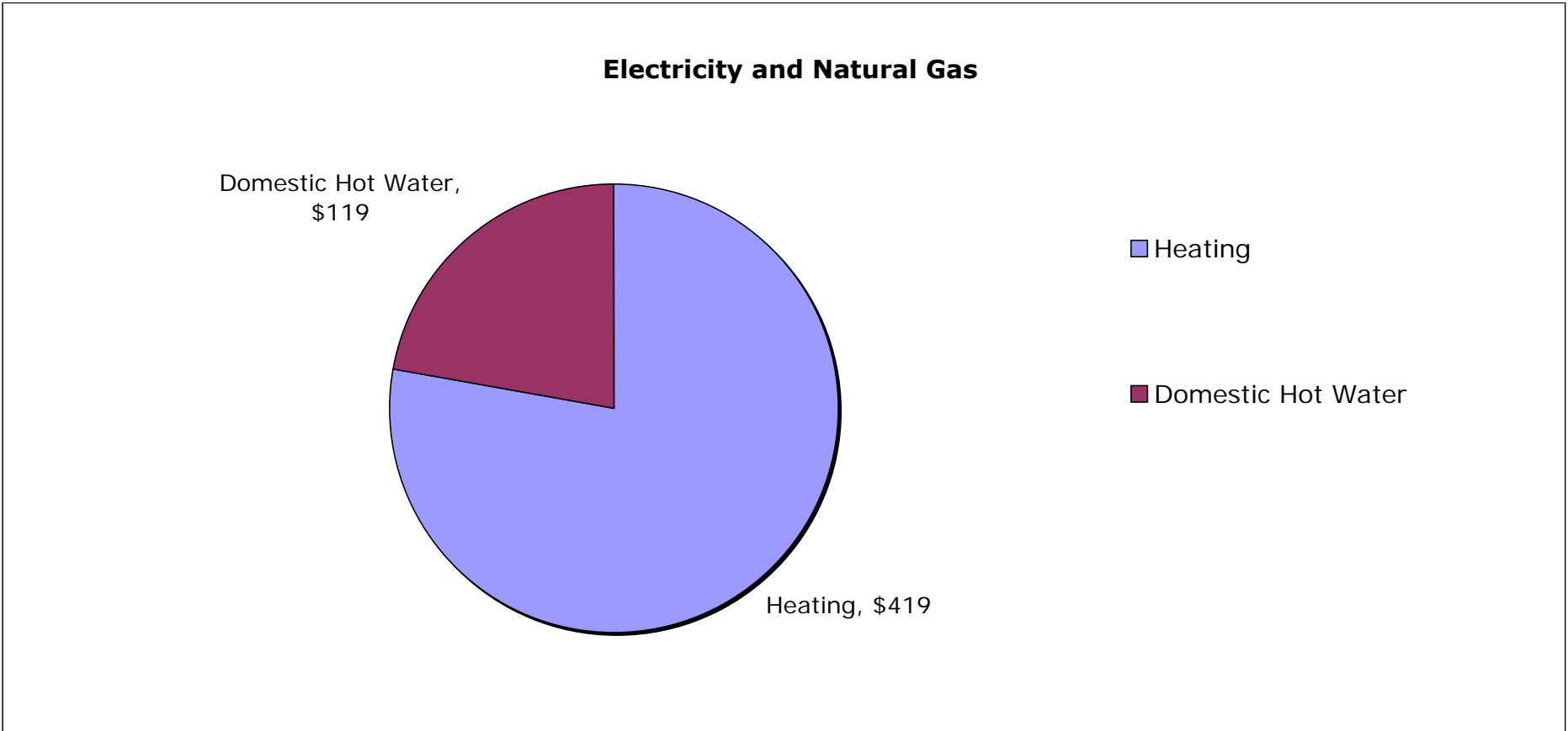


# Energy Analysis

## Disaggregated End Uses

### Liberty Hall Apartments

Natural gas is used for space heating and domestic hot water generation. Electricity is used for all other services and appliances. The following chart illustrates the disaggregated costs based on the end uses. Please note: the estimated end uses are base



End Use	Utility	Annual Cost	Annual Usage (kWh)	Annual Usage (therms)	Annual Usage (btu)
Heating	Natural Gas	\$419.13		265	26,515,073
Domestic Hot Water	Natural Gas	118.8762393		75	7,520,427

# Energy Analysis

## Notes

### Liberty Hall Apartments

Below are notes regarding the property metering schedule, general billing information, and specific usage details by utility type.

#### General

The property is master metered for water and sewer, and common area electricity, and natural gas (hallways, office, community spaces). The dwelling units are individually metered for electricity and gas consumption.

#### Natural Gas

Natural gas shows a normal consumption pattern, with spikes during the heating season since the property utilizes natural gas for heating purposes.

#### Electricity

Electricity is generally higher in the winter months, presumably to a higher demand for lighting caused by daylight savings time.

#### Water and Sewer

Water and sewer is billed every quarter. Water consumption appears to be gradually increasing over the past twelve months.

# Energy Assumptions Table

Below are the energy assumptions by category that were used as inputs for the TREAT model for the property.

These energy assumptions are based on the following:

1. The physical inspection of the property
2. Diagnostic testing conducted during the inspection
3. The historic utility billing information
4. The building blueprints/plans
5. Information provided by site management and maintenance staff

## General

Property Type (Family, Elderly, Commercial): **Family**  
Resident Population Persons: **32**

## Space Types

Units, Common Areas	Square Footage:	<b>13,500</b>	Conditioned:	<b>Yes (<i>resident paid utilities</i>)</b>
Basement	Square Footage:	<b>6,849</b>	Conditioned:	<b>No</b>
Office/Laundry	Square Footage:	<b>382</b>	Conditioned:	<b>Yes</b>

## Utility Metering

Common Spaces	Utility Type:	<b>Electricity</b>	Individual, Master:	<b>Master</b>
Whole Building	Utility Type:	<b>Natural Gas</b>	Individual, Master:	<b>Individual</b>
Whole Building	Utility Type:	<b>Water/Sewer</b>	Individual, Master:	<b>Master</b>
Dwelling Units	Utility Type:	<b>Electricity</b>	Individual, Master:	<b>Individual</b>

## Infiltration

Infiltration Condition	Tight, Leaky:	<b>Average</b>
Infiltration Rate	ACH:	<b>0.7</b>

## Architectural

Wall Insulation	Type:	<b>Fiberglass</b>	R-Value:	<b>R-12</b>
Roof Insulation	Type:	<b>Fiberglass</b>	R-Value:	<b>R-30</b>
Exterior Doors 1	Type:	<b>Flush Metal</b>	R-Value:	<b>&lt; R-5</b>
Exterior Doors 2	Type:	<b>Wood/Glass</b>	R-Value:	<b>&lt; R-5</b>
Windows 1	Type:	<b>Wood</b>	U-Factor:	<b>0.89</b>

## Heating and Cooling

### Temperature Control:

Occupied Heating Temp	Degrees F:	<b>70</b>
Occupied Cooling Temp	Degrees F:	<b>N/A</b>
Unoccupied <sup>1</sup> Heating Temp	Degrees F:	<b>68</b>
Unoccupied <sup>1</sup> Heating Time	Hours / Day:	<b>12</b>

### Boilers / DHW Generation:

Boiler 1	Type:	<b>Natural Gas</b>	Capacity:	<b>60 MBH</b>	Efficiency:	<b>79%</b>
Domestic Hot Water 1	Type:	<b>Indirect</b>	Capacity:	<b>40 gallon</b>	Efficiency:	

<sup>1</sup>Unoccupied temps/times based on opportunity for savings based on programmable thermostats

## Water & Sewer

### Domestic Hot Water:

DHW Daily Usage	Gallons/Resident:	<b>N/A</b>
DHW Delivery Temp	Degrees F:	<b>120</b>

### Domestic Cold Water:

Showerheads	Gallons / Minute:	<b>2.5</b>
Toilets	Gallons / Flush:	<b>1.6</b>
Irrigation	Gallons / Year:	<b>None</b>

## Lighting Loads

Hallway	Type:	<b>Fluorescent</b>	Wattage:	<b>26-56</b>	Hours per Day:	<b>8</b>
Community / Office	Type:	<b>Fluorescent</b>	Wattage:	<b>15-34</b>	Hours per Day:	<b>4-8</b>
Exterior	Type:	<b>High Pressure Sodium</b>	Wattage:	<b>100</b>	Hours per Day:	<b>12</b>

## Appliances, Miscellaneous Loads

Range	Energy Star (Y/N):	<b>No</b>	Usage per Year:	
Refrigerator	Energy Star (Y/N):	<b>No</b>	Usage per Year:	<b>994 kWh</b>
Dishwasher	Energy Star (Y/N):		Usage per Year:	

# Simple Payback Analysis

**EWCM** #1 Convert Lighting - Exterior

## Replacement Costs

A. Total cost to convert site lighting to LED fixtures:

\$12,024.00

## Utility Cost

Electricity: \$0.17  
Natural Gas: \$1.58

## Existing Types / Usage

	Description	Wattage per Fixture	Number of Fixtures	Lighting Hours/Day	Usage Days/Year	Usage kWh/Year	Usage \$/Year
Type 1:	Pole Mounted Lighting	150	2	12	365	1,314	\$223.34
Type 2:	Building Mounted Lighting	50	5	12	365	1,095	\$186.11
Type 3:	Building Mounted Lighting	150	8	12	365	5,256	\$893.35
Type 4:						0	\$0.00
Type 5:						0	\$0.00
Total:						7,665	\$1,302.80

## Proposed Green Types / Usage

	Description	Wattage per Fixture	Number of Fixtures	Lighting Hours/Day	Usage Days/Year	Usage kWh/Year	Usage \$/Year
Type 1:	Pole Mounted Lighting	35	2	12	365	307	\$52.11
Type 2:	Building Mounted Lighting	10	5	12	365	219	\$37.22
Type 3:	Building Mounted Lighting	35	8	12	365	1,226	\$208.45
Type 4:						0	\$0.00
Type 5:						0	\$0.00
Total:						1,752	\$297.78

## Annual Electric Savings

20,175,156 BTUs

5,913.00 kWh

Savings = 5,913.00 x \$0.17 = \$1,005.02 /yr

## Annual Natural Gas Savings<sup>1</sup>

0 BTUs

0.00 therms

Savings = 0.00 x \$1.58 = \$0.00 /yr

## Annual Net Cost Savings

\$1,005.02 + \$0.00 = \$1,005.02

## 5. Simple Payback

\$12,024.00 / \$1,005.02 = 11.96 yrs

## Additional Notes/Comments:

<sup>1</sup>Negative natural gas savings attributed to decrease in heating gain from the reduced lighting load (wattage); therefore, additional natural gas required for space heating in these areas.

# Simple Payback Analysis

**EWCM #2 Replace Boiler**

## Description

The office area is heated by a natural gas-fire boiler. The boiler could not be visually inspected on the day of the assessment. The boiler is estimated to be rated at 60MBH. The efficiency is estimated to be 79%

## Replacement Costs

	Type	Cost
A. Proposed Conventional:	In-Kind Replacements	\$2,713.00
B. Proposed Green:	Condensing Boiler (eff. 93%)	\$3,794.00
C. Incremental Cost Between Proposed Conventional and Proposed Green:		\$1,081.00

## Boiler Efficiencies

A. Existing Efficiency:	79%
B. Conventional Efficiency:	85%
C. Green Efficiency:	93%

## Annual Utility Cost

	Existing	Conventional	Green
	26,515,073 btus	23,274,192 btus	21,378,822 btus
	265.15 therms	232.74 therms	213.79 therms
Utility Cost	\$1.58/therm	\$1.58/therm	\$1.58/therm
Heating Cost	\$419.13	\$367.90	\$337.94

## Annual Savings: Existing to Conventional

Savings = \$419.13 - \$367.90 = \$51.23/yr

## Annual Savings: Conventional to Green

Savings = \$367.90 - \$337.94 = \$29.96/yr

## Annual Savings: Existing to Green

Savings = \$51.23 + \$29.96 = \$81.19/yr

## Simple Payback: Conventional

\$2,713.00 / \$51.23 = 53.0 yrs

## Simple Payback: Green

\$3,794.00 / \$81.19 = 46.7 yrs

## Incremental Payback: Conventional to Green

\$1,081.00 / \$29.96 = 36.1 yrs

# Simple Payback Analysis

## EWCM #3 Replace Windows - Common Areas

Replacement Costs	Type	Cost
A. Proposed Conventional:	Code Compliant Replacements	\$710.00
B. Proposed Green:	High Eff. Low E, Low U, Fiberglass Frames	\$763.00
C. Incremental Cost Between Proposed Conventional and Proposed Green:		\$53.00

Existing Conditions	
General: Slider models have poor fit and allow for appreciable air infiltration. Remaining models in fair condition with limited air infiltration.	
A. Window Type:	Double Hung
B. Total Area of Windows:	60 sf
C. Utility Cost:	Gas \$1.58 /therm

U-Factor <sup>1</sup>	
A. Existing:	0.89
B. Conventional:	0.67
C. Green:	0.30

Annual Savings: Existing to Conventional	
	700,000 BTUs
	7.00 therms
Savings =	\$1.58 x 7.00 = \$11.06 /yr

Annual Savings: Conventional to Green	
	500,000 BTUs
	5.00 therms
Savings =	\$1.58 x 5.00 = \$7.90 /yr

Annual Savings: Existing to Green	
	1,200,000 BTUs
	12.00 therms
Savings =	\$11.06 + \$7.90 = \$18.97 /yr

<b>Simple Payback: Conventional</b>				
\$710.00	/	\$11.06	=	64.2 yrs
<b>Simple Payback: Green</b>				
\$763.00	/	\$18.97	=	40.2 yrs
<b>Incremental Payback: Conventional to Green</b>				
\$53.00	/	\$7.90	=	6.7 yrs

Additional Notes:
1 The U-factors were derived from the 2001 ASHRAE Fundamentals Handbook, based on the specifications in the plan

# Simple Payback Analysis

**EWCM** #4 Add Roof Insulation

Replacement Costs	Type	Cost
A. Proposed Conventional:	Maintain Existing	\$ -
B. Proposed Green:	Add 7-inches of Blown in	\$ 676.14
C. Incremental Cost Between Proposed Conventional and Proposed Green:		\$ 676.14

Existing Conditions		
A. Roof area:	382	sf
B. Type of existing roof structure:	Pitched	
C. Utility Cost:	Gas \$1.58	/therm
D. Existing Heating Efficiency:	79%	

R-Value	
A. Existing:	25.00
B. Conventional:	25
C. Proposed Green:	48

Annual Savings: Existing to Conventional			
			0 BTUs
			0.00 therms
Savings =	\$1.58	x	0.00 = \$0.00 /yr

Annual Savings: Conventional to Green			
			1,100,000 BTUs
			11.00 therms
Savings =	\$1.58	x	11.00 = \$17.39 /yr

Annual Savings: Existing to Green			
			1,100,000 BTUs
			11.00 therms
Savings =	\$0.00	x	\$17.39 = \$17.39 /yr

<b>Simple Payback: Conventional</b>			
\$0.00	/	\$0.00	= N/A yrs
<b>Simple Payback: Green</b>			
\$676.14	/	\$17.39	= 38.9 yrs
<b>Incremental Payback: Conventional to Green</b>			
\$676.14	/	\$17.39	= 38.9 yrs

Additional Notes:



## Simple Payback Analysis

**EWCM** #5 Replace Refrigerators - Common Area

### Replacement Costs

A. Proposed Conventional	\$670.00
B. Proposed Green	\$720.25
C. Incremental Cost Between Proposed Conventional and Proposed Green	\$50.25

Electricity:	\$0.17
Natural Gas:	\$1.58

### Existing Conditions

A. Existing refrigerator type	Frost-free
B. Number of refrigerators	1
C. Average annual energy use per refrigerator	994 kWh / Year
D. Total annual energy use	994.00 kWh / Year
E. Total annual operational cost	\$168.95 \$ / Year

### Proposed Conventional Conditions

A. Proposed standard refrigerator type	Frost-free
B. Number of refrigerators	1
C. Average annual energy use per refrigerator	425 kWh / Year
D. Total annual energy use	425.00 kWh / Year
E. Total annual operational cost	\$72.24 \$ / Year

### Proposed Green Conditions

A. Proposed green refrigerator type	Frost-free
B. Number of refrigerators	1
C. Average annual energy use per refrigerator	360 kWh / Year
D. Total annual energy use	360.00 kWh / Year
E. Total annual operational cost	\$61.19 \$ / Year

### Annual Savings: Existing to Proposed Conventional

Electricity:	\$0.17	x	569.00	=	\$96.71	\$ / Year
Natural Gas <sup>1</sup> :	\$1.58	x		=	\$0.00	\$ / Year
Total:				=	\$96.71	\$ / Year

### Annual Savings: Proposed Conventional to Proposed Green

Electricity:	\$0.17	x	65.00	=	\$11.05	\$ / Year
Natural Gas <sup>1</sup> :	\$1.58	x	-3.00	=	-\$4.74	\$ / Year
Total:				=	\$6.31	\$ / Year

### Annual Savings: Existing to Proposed Green

Electricity:	\$0.17	x	634.00	=	\$107.76	\$ / Year
Natural Gas <sup>1</sup> :	\$1.58	x	-3.00	=	-\$4.74	\$ / Year
Total:				=	\$103.02	\$ / Year

### Simple Payback: Conventional

1B	10
\$670.00	\$96.71
/	=
	6.93 yrs

### Simple Payback: Green

\$720.25	\$103.02
/	=
	6.99 yrs

### Incremental Payback: Proposed Conventional to Proposed Green

\$50.25	\$6.31
/	=
	7.97 yrs

### Additional Notes/Comments:

<sup>1</sup>Negative natural gas savings attributed to decrease in heating gain from the reduced refrigerator wattage; therefore, additional natural gas required for space heating in these areas.

# Simple Payback Analysis

**EWCM** #6 Convert Lighting and Add Occupancy Controls - Common Area

## Replacement Costs

A. Total cost to convert fluorescent lighting to LED and add occupancy controls: \$990.00

## Utility Cost

Electricity: \$0.17  
Natural Gas: \$1.58

## Existing Types / Usage

Description	Wattage per Fixture	Number of Fixtures	Lighting Hours/Day	Usage Days/Year	Usage kWh/Year	Usage \$/Year
Type 1: T8 Lamps	34	12	6	250	612	\$104.02
Type 2: CFL Lamps	15	5	24	356	641	\$108.92
Type 3:					0	\$0.00
Type 4:					0	\$0.00
Type 5:					0	\$0.00
Total:				1,253	\$212.94	

## Proposed Green Types / Usage

Description	Wattage per Fixture	Number of Fixtures	Lighting Hours/Day <sup>1</sup>	Usage Days/Year	Usage kWh/Year	Usage \$/Year
Type 1: LED T8 Lamps	15	12	4	250	180	\$30.59
Type 2: LED Lamps	8	5	24	365	329	\$55.83
Type 3:					0	\$0.00
Type 4:					0	\$0.00
Type 5:					0	\$0.00
Total:				509	\$86.43	

## Annual Electric Savings

2,539,552 BTUs  
744.30 kWh  
Savings = 744.30 x \$0.17 = \$126.51/yr

## Annual Natural Gas Savings<sup>2</sup>

-500,000 BTUs  
-5.00 therms  
Savings = -5.00 x \$1.58 = -\$7.90/yr

## Annual Net Cost Savings

\$126.51 + -\$7.90 = \$118.60

## 5. Simple Payback

\$990.00 / \$118.60 = 8.35 yrs

## Additional Notes/Comments:

<sup>1</sup>This worksheet assumes that if occupancy controls are installed, the total lighting hours can effectively be reduced by 34% (2 hours per day).

<sup>2</sup>Negative natural gas savings attributed to decrease in heating gain from the reduced lighting hours; therefore, additional natural gas required for space heating in these areas.

# Simple Payback Analysis

**EWCM #7 Replace Washing Machines - Common Area**

## 1. Replacement Costs

A. Proposed Conventional	\$0.00
B. Proposed Green	\$0.00
C. Incremental Cost Between Proposed Conventional and Proposed Green	\$0.00

## 2. Existing Conditions

A. Total number of inefficient washing machines	2
B. Estimated number of total annual cycles/washer <sup>1</sup>	416

## 3. Annual Energy and Water Use Existing Models

	Annual energy use <sup>2</sup>		Utility cost		Total annual cost
Gas (therms):	16.10	x	\$1.58	=	\$25.45
Electric (kWh):	670	x	\$0.17	=	\$113.88
Water/Sewer (gal):	12,252.00	x	\$0.0085	=	\$104.35
					3
					\$243.68

## 4. Annual Energy and Water Use Proposed Conventional Models

	Annual energy use <sup>2</sup>		Utility cost		Total annual cost
Gas (therms):	16.10	x	\$1.58	=	\$25.45
Electric (kWh):	670.00	x	\$0.17	=	\$113.88
Water/Sewer (gal):	12,252.00	x	\$0.0085	=	\$104.35
					4
					\$243.68

## 5. Annual Energy and Water Use Proposed Green Models

	Annual energy use <sup>2</sup>		Utility cost		Total annual cost
Gas (therms):	7.20	x	\$1.58	=	\$11.38
Electric (kWh):	487.00	x	\$0.17	=	\$82.77
Water/Sewer (gal):	7,738.00	x	\$0.0085	=	\$65.91
					5
					\$160.06

## 6. Annual Savings: Existing to Proposed Conventional

3	4	6
\$243.68	- \$243.68	= \$0.00 /yr

## 7. Annual Savings: Proposed Conventional to Proposed Green

4	5	7
\$243.68	- \$160.06	= \$83.62 /yr

## 8. Annual Natural Gas Savings<sup>2</sup>

Cost/therm	x	therms	=	\$0.00 /yr
------------	---	--------	---	------------

## 9. Simple Payback: Existing to Proposed Green

\$0.00	/	( \$0.00 + \$83.62 )	=	N/A yrs
--------	---	----------------------	---	---------

## Incremental Payback: Proposed Conventional to Proposed Green

\$0.00	/	\$83.62	=	N/A yrs
--------	---	---------	---	---------

## Additional Notes/Comments:

<sup>1</sup> This worksheet assumes that on average, residents use the washing machines 1-2 times per week.

Costs are not carried for washing machine replacement, since the laundry equipment is maintained under the terms of a leasing agreement; the efficacy of this measure depends on the availability of Energy Star rated equipment from the lessor.

# Simple Payback Analysis

**EWCM #8 Replace Toilets - Dwelling Units**

## Replacement Costs

A. Proposed Conventional	\$6,720.00
B. Proposed Green	\$7,224.00
C. Incremental Cost Between Proposed Conventional and Proposed Green	\$504.00

## Existing Conditions

A. Total number of existing toilets	16	
B. Average gallons per flush:	2.5	
C. Estimated total number of flushes per day:	5.0	
D. Estimated total daily usage per toilet:	13	gal/day
E. Estimated number of days per year facility in use:	365	
F. Cost of water and sewer:	\$0.0085	(\$/gal)

## Proposed Conditions: Conventional Models

A. Total number of toilets	16	
B. Average gallons per flush:	1.6	
C. Estimated total number of flushes per day	5.0	
D. Estimated total daily usage per toilet:	8	gal/day
E. Estimated number of days per year facility in use:	365	
F. Cost of water and sewer:	\$0.0085	(\$/gal)

## Proposed Conditions: Green Models

A. Total number of toilets	16	
B. Average gallons per flush:	1.28	
C. Estimated total number of flushes per day	5.0	
D. Estimated total daily usage per toilet:	6	gal/day
E. Estimated number of days per year facility in use:	365	
F. Cost of water and sewer:	\$0.0085	(\$/gal)

## Annual Water Use: Existing Models

$$16 \times 13 \times 365 = 73,000 \text{ gal/yr}$$

## Annual Water Use: Proposed Conventional Models

$$16 \times 8 \times 365 = 46,720 \text{ gal/yr}$$

## Annual Water Use: Proposed Green Models

$$16 \times 6 \times 365 = 37,376 \text{ gal/yr}$$

## Annual Savings: Existing to Proposed Conventional Models

$$73,000 - 46,720 \times \$0.01 = \$223.83 \text{ \$/yr}$$

## Annual Savings: Proposed Conventional to Proposed Green Models

$$46,720 - 37,376 \times \$0.01 = \$79.58 \text{ \$/yr}$$

## Annual Savings: Existing to Proposed Green Models

$$\$223.83 + \$79.58 = \$303.41 \text{ \$/yr}$$

## Simple Payback: Conventional

$$\$6,720.00 / \$223.83 = 30.02 \text{ yrs}$$

## Simple Payback: Green

$$\$7,224.00 / \$303.41 = 23.81 \text{ yrs}$$

## Incremental Payback: Proposed Conventional to Proposed Green Models

$$\$504.00 / \$223.83 = 2.25 \text{ yrs}$$

## Simple Payback Analysis

**EWCM** #9 Replace Showerheads - Dwelling Units

### Installation Costs

Costs to install low-flow (1.7 gpm) showerheads:

### Utility Costs

Water & Sewer:   
Natural Gas:

### Existing Conditions

A. Number of showerheads   
B. Number of showers per day per showerhead   
C. Average number of minutes per shower   
D. Showerhead flowrate

### Proposed Green Conditions

A. Number of showerheads   
B. Number of showers per day per showerhead   
C. Average number of minutes per shower   
D. Showerhead flowrate

### Annual Usage: Existing

Water & Sewer

365 x  x  x  x

Total Domestic Cold Water Usage:  gal / Year

Natural Gas

### Annual Usage: Proposed Green

Water & Sewer

365 x  x  x  x

Total Domestic Cold Water Usage =  gal / Year

Natural Gas

### Annual Savings: Existing to Proposed Green

Water & Sewer:  -  =  gal / Year

x  =  \$ / Year

Natural Gas:  -  =  therms / Year

x  =  \$ / Year

### Simple Payback: Green

/ (  +  ) =  yrs

### Additional Notes/Comments:

<sup>1</sup>Total domestic hot water usage represents 80% of domestic cold water usage for showers (20% cold water and 80% hot water to reach 110° desired water temperature).

<sup>2</sup>btus per year calculated from the following values:

A: 65 = Temperature increase between cold water (55°) and hot water delivery (120°)

B: 8.335 = Energy (in btus/gal) to heat domestic hot water per degree Fahrenheit

# Life Cycle Cost Analysis

Energy and Water Conservation Measure (EWCM): # 1

Convert Exterior Lighting

vs.

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term **20**

Conventional Product: **0**

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

### Life Cycle Costs

Install/Replace	Parking Area Lighting	2	ea	\$2,570.00	\$5,140	20	1	1.0	\$5,140	\$5,140
Install/Replace	Building Mounted Lighting	13	ea	\$465.00	\$6,045	15	1	1.3	\$8,396	\$7,376
Utility Cost	Electricity	7,665	kWh	\$0.17	\$1,303	1	1	20.0	\$35,007	\$17,236
Total Life Cycle Cost									<b>\$48,543</b>	<b>\$29,753</b>

### Energy Savings

Net Life Cycle Cost after Energy Savings									<b>\$48,543</b>	<b>\$29,753</b>
--	--	--	--	--	--	--	--	--	-----------------	-----------------

Green Product: **0**

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

### Life Cycle Costs

Install/Replace	Parking Area Lighting	2	ea	\$2,762.75	\$5,526	20	1	1.0	\$5,526	\$5,526
Install/Replace	Building Mounted Lighting	13	ea	\$499.88	\$6,498	15	1	1.3	\$9,026	\$7,930
Utility Cost	Electricity	1,752	kWh	\$0.17	\$298	1	1	20.0	\$8,002	\$3,940
Total Life Cycle Cost									<b>\$22,553</b>	<b>\$17,395</b>

### Energy Savings

Net Life Cycle Cost after Energy Savings									<b>\$22,553</b>	<b>\$17,395</b>
--	--	--	--	--	--	--	--	--	-----------------	-----------------

## ECONOMIC RETURN ANALYSIS

Green NPV	<b>\$12,358</b>
Green IRR	<b>n/a</b>

## PRODUCT RECOMMENDATION

### Recommendation based on Economic Return Analysis

Green Product: **0**

Override with Green Product? **No**

### Final Product Choice

Green Product: **0**

### Notes:

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.
2. Green NPV and Green IRR are relative measures comparing Green vs. Conventional implementation.

# Energy and Water Conservation Measure (EWCM): # 1

# Convert Exterior Lighting

## STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product

Final Product Choice

Green Product:

0

## Immediate Replacement

									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Parking Area Lighting	2	ea	\$2,762.75	\$5,526	20	1	1.0	\$5,526	\$5,526
Install/Replace	Building Mounted Lighting	13	ea	\$499.88	\$6,498	15	1	1.3	\$9,026	\$7,930
Utility Cost	Electricity	1,752	kWh	\$0.17	\$298	1	1	20.0	\$8,002	\$3,940
Total Life Cycle Cost									\$22,553	\$17,395
Energy Savings										
Net Life Cycle Cost after Energy Savings									\$22,553	\$17,395

## ECONOMIC RETURN ANALYSIS

Timing NPV	n/a
Timing IRR	n/a

## TIMING RECOMMENDATION

Replacement Year:

1

### Notes:

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.
2. Timing NPV and Timing IRR are relative measures comparing Immediate Replacement vs. Replacement at End of Remaining Useful Life.

# Life Cycle Cost Analysis

Energy and Water Conservation Measure (EWCM): # 2

Replace Boiler

In-Kind Replacement (85% eff.)

vs.

Condensing Replacement (93% eff.)

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term

25

Conventional Product:

In-Kind Replacement (85% eff.)

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

### Life Cycle Costs

Install/Replace	In-Kind Replacement	1	ea	\$2,713.00	\$2,713	25	1	1.0	\$2,713	\$2,713
Utility Cost	Natural Gas	233	therms	\$1.58	\$368	1	1	25.0	\$13,413	\$5,517
Total Life Cycle Cost									\$16,126	\$8,230

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$16,126	\$8,230

Green Product:

Condensing Replacement (93% eff.)

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

### Life Cycle Costs

Install/Replace	Condensing Replacement	1	ea	\$3,794.00	\$3,794	20	1	1.3	\$4,862	\$4,352
Utility Cost	Natural Gas	214	therms	\$1.58	\$338	1	1	25.0	\$12,321	\$5,068
Total Life Cycle Cost									\$17,183	\$9,420

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$17,183	\$9,420

## ECONOMIC RETURN ANALYSIS

Green NPV	(\$1,190)
Green IRR	(3.0%)

## PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Conventional Product: In-Kind Replacement (85% eff.)

Override with Green Product? No

Final Product Choice

Conventional Product: In-Kind Replacement (85% eff.)

### Notes:

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.
2. Green NPV and Green IRR are relative measures comparing Green vs. Conventional implementation.



# Energy and Water Conservation Measure (EWCM): # 2

# Replace Boiler

## STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product

Final Product Choice

Conventional Product: In-Kind Replacement (85% eff.)

### Immediate Replacement

									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	In-Kind Replacement	1	ea	\$2,713.00	\$2,713	25	1	1.0	\$2,713	\$2,713
Utility Cost	Natural Gas	233	therms	\$1.58	\$368	1	1	25.0	\$13,413	\$5,517
Total Life Cycle Cost									\$16,126	\$8,230
Energy Savings										
Net Life Cycle Cost after Energy Savings									\$16,126	\$8,230

## ECONOMIC RETURN ANALYSIS

Timing NPV	n/a
Timing IRR	n/a

## TIMING RECOMMENDATION

Replacement Year: 1

### Notes:

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.
2. Timing NPV and Timing IRR are relative measures comparing Immediate Replacement vs. Replacement at End of Remaining Useful Life.

# Life Cycle Cost Analysis

Energy and Water Conservation Measure (EWCN): # 3

Replace Windows - Office

Conventional Double Pane Replacements

vs.

High Eff. Low E, Low U, Fiberglass Models

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term

35

Conventional Product:

Conventional Double Pane Replacements

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

### Life Cycle Costs

Install/Replace	Standard Replacements	2	ea	\$355.00	\$710	35	1	1.0	\$710	\$710
Total Life Cycle Cost									\$710	\$710

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$710	\$710

Green Product:

High Eff. Low E, Low U, Fiberglass Models

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

### Life Cycle Costs

Install/Replace	High Eff. Replacement	2	ea	\$381.63	\$763	35	1	1.0	\$763	\$763
Total Life Cycle Cost									\$763	\$763

### Energy Savings

Utility Cost	Natural Gas	12	therms	\$1.58	(\$19)	1	1	35.0	(\$1,147)	(\$332)
Net Life Cycle Cost after Energy Savings									(\$384)	\$432

## ECONOMIC RETURN ANALYSIS

Green NPV	\$278
Green IRR	60.0%

## PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: High Eff. Low E, Low U, Fiberglass Models

Override with Green Product? No

Final Product Choice

Green Product: High Eff. Low E, Low U, Fiberglass Models

### Notes:

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.
2. Green NPV and Green IRR are relative measures comparing Green vs. Conventional implementation.

# Energy and Water Conservation Measure (EWCM): # 3

# Replace Windows - Office

## STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product

Final Product Choice

Green Product: High Eff. Low E, Low U, Fiberglass Models

### Immediate Replacement

									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	High Eff. Replacement	2	ea	\$381.63	\$763	35	1	1.0	\$763	\$763
Total Life Cycle Cost									\$763	\$763

### Energy Savings

Utility Cost	Natural Gas	12	therms	\$1.58	(\$19)	1	1	35.0	(\$1,147)	(\$332)
Net Life Cycle Cost after Energy Savings									(\$384)	\$432

## ECONOMIC RETURN ANALYSIS

Timing NPV	n/a
Timing IRR	n/a

## TIMING RECOMMENDATION

Replacement Year:	1
-------------------	---

### Notes:

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.
2. Timing NPV and Timing IRR are relative measures comparing Immediate Replacement vs. Replacement at End of Remaining Useful Life.

# Life Cycle Cost Analysis

Energy and Water Conservation Measure (EWCM): # 4

Add Roof Insulation

Maintain Existing

vs.

Add 7-inches Cellulose

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term

20

Conventional Product:

Maintain Existing

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

### Life Cycle Costs

Maintain	Maintain	382	sf	\$0.00		20	1	1.0		
Total Life Cycle Cost									\$0	\$0

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$0	\$0

Green Product:

Add 7-inches Cellulose

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

### Life Cycle Costs

Install/Replace	7-inches Insulation	382	sf	\$1.77	\$676	20	1	1.0	\$676	\$676
Total Life Cycle Cost									\$676	\$676

### Energy Savings

Utility Cost	Natural gas	11	therms	\$1.58	(\$17)	1	1	20.0	(\$467)	(\$230)
Net Life Cycle Cost after Energy Savings									\$209	\$446

## ECONOMIC RETURN ANALYSIS

Green NPV	(\$446)
Green IRR	(3.3%)

## PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Conventional Product: Maintain Existing

Override with Green Product? No

Final Product Choice

Conventional Product: Maintain Existing

### Notes:

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.
2. Green NPV and Green IRR are relative measures comparing Green vs. Conventional implementation.

# Energy and Water Conservation Measure (EWCM): # 4

## Add Roof Insulation

### STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product

Final Product Choice

Conventional Product:

Maintain Existing

#### Immediate Replacement

									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Maintain	Maintain	382	sf			20	1	1.0		
Total Life Cycle Cost									\$0	\$0
Energy Savings										
Net Life Cycle Cost after Energy Savings									\$0	\$0

### ECONOMIC RETURN ANALYSIS

Timing NPV	n/a
Timing IRR	n/a

### TIMING RECOMMENDATION

Replacement Year:	1
-------------------	---

#### Notes:

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.
2. Timing NPV and Timing IRR are relative measures comparing Immediate Replacement vs. Replacement at End of Remaining Useful Life.

# Life Cycle Cost Analysis

Energy and Water Conservation Measure (EWCM): # 5

Replace Refrigerator - Common Area

Non Energy Star Model

vs.

Energy Star Model

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term

15

Conventional Product:

Non Energy Star Model

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

### Life Cycle Costs

Install/Replace	Non Energy Star	1	ea	\$670.00	\$670	15	1	1.0	\$670	\$670
Utility Cost	Electricity	425	kWh	\$0.17	\$72	1	1	15.0	\$1,344	\$794
Total Life Cycle Cost									\$2,014	\$1,464

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$2,014	\$1,464

Green Product:

Energy Star Model

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

### Life Cycle Costs

Install/Replace	Energy Star Model	1	ea	\$720.25	\$720	15	1	1.0	\$720	\$720
Utility Cost	Electricity	360	kWh	\$0.17	\$61	1	1	15.0	\$1,138	\$673
Total Life Cycle Cost									\$1,858	\$1,393

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$1,858	\$1,393

## ECONOMIC RETURN ANALYSIS

Green NPV	\$71
Green IRR	31.0%

## PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: Energy Star Model

Override with Green Product? No

Final Product Choice

Green Product: Energy Star Model

### Notes:

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.
2. Green NPV and Green IRR are relative measures comparing Green vs. Conventional implementation.

**Energy and Water Conservation Measure (EWCM): # 5**
**Replace Refrigerator - Common Area**
**STEP TWO: REPLACEMENT TIMING**

Remaining Useful Life of Existing Product

Final Product Choice

Green Product:

Energy Star Model

**Immediate Replacement**

									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Energy Star Model	1	ea	\$720.25	\$720	15	1	1.0	\$720	\$720
Utility Cost	Electricity	360	kWh	\$0.17	\$61	1	1	15.0	\$1,138	\$673
Total Life Cycle Cost									<b>\$1,858</b>	<b>\$1,393</b>
<i>Energy Savings</i>										
Net Life Cycle Cost after Energy Savings									<b>\$1,858</b>	<b>\$1,393</b>

**ECONOMIC RETURN ANALYSIS**

Timing NPV	n/a
Timing IRR	n/a

**TIMING RECOMMENDATION**

Replacement Year:	<b>1</b>
-------------------	----------

**Notes:**

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.
2. Timing NPV and Timing IRR are relative measures comparing Immediate Replacement vs. Replacement at End of Remaining Useful Life.

# Life Cycle Cost Analysis

Energy and Water Conservation Measure (EWCM): # 6

Convert Lighting - Common Areas

Maintain Existing

vs.

Install LED Lamps

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term

20

Conventional Product:

Maintain Existing

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

### Life Cycle Costs

Maintain	T8 Lamps	12	ea	\$7.50	\$90	8	1	2.5	\$270	\$175
Maintain	CFL Lamps	5	ea	\$6.50	\$33	7	1	2.9	\$113	\$71
Utility Cost	Electricity	1,253	kWh	\$0.17	\$213	1	1	20.0	\$5,723	\$2,818
Total Life Cycle Cost									\$6,106	\$3,064

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$6,106	\$3,064
--	--	--	--	--	--	--	--	--	---------	---------

Green Product:

Install LED Lamps

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

### Life Cycle Costs

Install/Replace	LED T8 Lamps	12	ea	\$60.00	\$720	20	1	1.0	\$720	\$720
Install/Replace	LED Lamps	5	ea	\$32.00	\$160	15	1	1.3	\$222	\$195
Install/Replace	Occupancy Sensors	2	ea	\$55.00	\$110	15	1	1.3	\$153	\$134
Utility Cost	Electricity	509	kWh	\$0.17	\$87	1	1	20.0	\$2,325	\$1,145
Utility Cost	Heating Penalty	5	therms	\$1.58	\$8	1	1	20.0	\$212	\$105
Total Life Cycle Cost									\$3,632	\$2,299

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$3,632	\$2,299
--	--	--	--	--	--	--	--	--	---------	---------

## ECONOMIC RETURN ANALYSIS

Green NPV	\$765
Green IRR	18.9%

## PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: Install LED Lamps

Override with Green Product? No

Final Product Choice

Green Product: Install LED Lamps

### Notes:

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.
2. Green NPV and Green IRR are relative measures comparing Green vs. Conventional implementation.



# Energy and Water Conservation Measure (EWCM): # 6

# Convert Lighting - Common Areas

## STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product

Final Product Choice

Green Product:

Install LED Lamps

### Immediate Replacement

									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	LED T8 Lamps	12	ea	\$60.00	\$720	20	1	1.0	\$720	\$720
Install/Replace	LED Lamps	5	ea	\$32.00	\$160	15	1	1.3	\$222	\$195
Install/Replace	Occupancy Sensors	2	ea	\$55.00	\$110	15	1	1.3	\$153	\$134
Utility Cost	Electricity	509	kWh	\$0.17	\$87	1	1	20.0	\$2,325	\$1,145
Utility Cost	Heating Penalty	5	therms	\$1.58	\$8	1	1	20.0	\$212	\$105
Total Life Cycle Cost									\$3,632	\$2,299

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$3,632	\$2,299

## ECONOMIC RETURN ANALYSIS

Timing NPV	n/a
Timing IRR	n/a

## TIMING RECOMMENDATION

Replacement Year:	1
-------------------	---

### Notes:

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.
2. Timing NPV and Timing IRR are relative measures comparing Immediate Replacement vs. Replacement at End of Remaining Useful Life.

## Life Cycle Cost Analysis

### Energy and Water Conservation Measure (EWCM): # 7

## Replace Washing Machines

### Non Energy Star

**VS.**

**Energy Star**

*(Conventional Product)*

*(Green Product)*

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term
10.00

**O**

### Conventional Product:

### Non Energy Star

Cost over Life Cycle (EUL)
----------------------------

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

### Life Cycle Costs

[illegible]

### Energy Savings

<b>Net Life Cycle Cost after Energy Savings</b>										<b>\$0</b>	<b>\$0</b>

**Green Product:**

**Energy Star**

### Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

### Life Cycle Costs

[illegible]

### Energy Savings

[illegible]

## ECONOMIC RETURN ANALYSIS

<b>Green NPV</b>	<b>\$0</b>
<b>Green IRR</b>	<b>n/a</b>

## PRODUCT RECOMMENDATION

### Recommendation based on Economic Return Analysis

Conventional Product:	Non Energy Star
-----------------------	-----------------

Override with Green Product?	No
------------------------------	----

### Final Product Choice

<b>Conventional Product:</b>	<b>Non Energy Star</b>
------------------------------	------------------------

**Notes:**

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.
2. Green NPV and Green IRR are relative measures comparing Green vs. Conventional implementation.

Energy and Water Conservation Measure (EWCM): # 7

Replace Washing Machines

## STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product

Final Product Choice

Conventional Product:

Non Energy Star

### Immediate Replacement

									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
	Leased Equipment									
Total Life Cycle Cost									\$0	\$0
Energy Savings										
Net Life Cycle Cost after Energy Savings									\$0	\$0

## ECONOMIC RETURN ANALYSIS

Timing NPV	n/a
Timing IRR	n/a

## TIMING RECOMMENDATION

Replacement Year:	1
-------------------	---

### Notes:

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.
2. Timing NPV and Timing IRR are relative measures comparing Immediate Replacement vs. Replacement at End of Remaining Useful Life.

# Life Cycle Cost Analysis

Energy and Water Conservation Measure (EWCM): # 8

Replace Toilets - Dwelling Units

Conventional Low Flow Replacement (1.6 gpf)

vs.

High Efficiency

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term 25

### Conventional Product:

### Conventional Low Flow Replacement (1.6 gpf)

### Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

#### Life Cycle Costs

Install/Replace	Low Flow (1.6 gpf Models)	16	ea	\$420.00	\$6,720	25	1	1.0	\$6,720	\$6,720
Utility Cost	Water/Sewer	46,720	gal	\$0.01	\$398	1	1	25.0	\$14,508	\$5,967
Total Life Cycle Cost									\$21,228	\$12,687

#### Energy Savings

Net Life Cycle Cost after Energy Savings									\$21,228	\$12,687

### Green Product:

### High Efficiency

### Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

#### Life Cycle Costs

Install/Replace	High Eff. (1.28 gpf models)	16	ea	\$451.50	\$7,224	25	1	1.0	\$7,224	\$7,224
Utility Cost	Water/Sewer	37,376	gal	\$0.01	\$318	1	1	25.0	\$11,606	\$4,774
Total Life Cycle Cost									\$18,830	\$11,998

#### Energy Savings

Net Life Cycle Cost after Energy Savings									\$18,830	\$11,998

## ECONOMIC RETURN ANALYSIS

Green NPV	\$689
Green IRR	22.0%

## PRODUCT RECOMMENDATION

### Recommendation based on Economic Return Analysis

Green Product: High Efficiency

Override with Green Product? No

### Final Product Choice

Green Product: High Efficiency

#### Notes:

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.
2. Green NPV and Green IRR are relative measures comparing Green vs. Conventional implementation.

Energy and Water Conservation Measure (EWCM): # 8

Replace Toilets - Dwelling Units

## STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product

Final Product Choice

Green Product:

High Efficiency

### Immediate Replacement

									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	High Eff. (1.28 gpf models)	16	ea	\$451.50	\$7,224	25	1	1.0	\$7,224	\$7,224
Utility Cost	Water/Sewer	37,376	gal	\$0.01	\$318	1	1	25.0	\$11,606	\$4,774
Total Life Cycle Cost									\$18,830	\$11,998
<i>Energy Savings</i>										
Net Life Cycle Cost after Energy Savings									\$18,830	\$11,998

## ECONOMIC RETURN ANALYSIS

Timing NPV	n/a
Timing IRR	n/a

## TIMING RECOMMENDATION

Replacement Year:	1
-------------------	---

### Notes:

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.
2. Timing NPV and Timing IRR are relative measures comparing Immediate Replacement vs. Replacement at End of Remaining Useful Life.

# Life Cycle Cost Analysis

Energy and Water Conservation Measure (EWCM): # 9

Install Low Flow Shower Heads

Maintain Existing

vs.

Install 1.7gpm Models

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term

20

Conventional Product:

Maintain Existing

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

### Life Cycle Costs

Maintain	Maintain	16	ea	\$0.00		20	1	1.0		
Utility Cost	Water/Sewer	569,400	gal	\$0.01	\$4,850	1	1	20.0	\$130,311	\$64,161
Total Life Cycle Cost									\$130,311	\$64,161

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$130,311	\$64,161

Green Product:

Install 1.7gpm Models

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

### Life Cycle Costs

Install/Replace	Low Flow 1.7 gpm Models	16	ea	\$18.50	\$296	20	1	1.0	\$296	\$296
Utility Cost	Water/Sewer	387,192	gal	\$0.01	\$3,298	1	1	20.0	\$88,612	\$43,629
Total Life Cycle Cost									\$88,908	\$43,925

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$88,908	\$43,925

## ECONOMIC RETURN ANALYSIS

Green NPV	\$20,235
Green IRR	n/a

## PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: Install 1.7gpm Models

Override with Green Product? No

Final Product Choice

Green Product: Install 1.7gpm Models

### Notes:

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.
2. Green NPV and Green IRR are relative measures comparing Green vs. Conventional implementation.

**Energy and Water Conservation Measure (EWCM): # 9**
**Install Low Flow Shower Heads**
**STEP TWO: REPLACEMENT TIMING**

Remaining Useful Life of Existing Product

Final Product Choice

Green Product:

Install 1.7gpm Models

**Immediate Replacement**

									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Low Flow 1.7 gpm Models	16	ea	\$18.50	\$296	20	1	1.0	\$296	\$296
Utility Cost	Water/Sewer	387,192	gal	\$0.01	\$3,298	1	1	20.0	\$88,612	\$43,629
Total Life Cycle Cost									\$88,908	\$43,925
<b>Energy Savings</b>										
Net Life Cycle Cost after Energy Savings									\$88,908	\$43,925

**ECONOMIC RETURN ANALYSIS**

Timing NPV	n/a
Timing IRR	n/a

**TIMING RECOMMENDATION**

Replacement Year:	1
-------------------	---

**Notes:**

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.
2. Timing NPV and Timing IRR are relative measures comparing Immediate Replacement vs. Replacement at End of Remaining Useful Life.

# Life Cycle Cost Analysis

Green Measure (GM):

# 1

Fencing

Chain Link Fencing

vs.

FSC Certified Wood (Stockade Fencing)

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term

25

Conventional Product:

Chain Link Fencing

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

### Life Cycle Costs

Install/Replace	Chain Link fencing	690	lf	\$16.16	\$11,150	15	1	1.7	\$20,967	\$15,435
Install/Replace	Dumpster Enclosure	2	ea	\$808.00	\$1,616	20	1	1.3	\$2,071	\$1,854
Total Life Cycle Cost									\$23,038	\$17,289

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$23,038	\$17,289

Green Product:

FSC Certified Wood (Stockade Fencing)

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

### Life Cycle Costs

Install/Replace	FSC Certified Wood	690	ls	\$21.00	\$14,490	25	1	1.0	\$14,490	\$14,490
Install/Replace	Dumpster Elcosure	2	ea	\$1,050.00	\$2,100	25	1	1.0	\$2,100	\$2,100
Total Life Cycle Cost									\$16,590	\$16,590

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$16,590	\$16,590

## ECONOMIC RETURN ANALYSIS

Green NPV	\$699
Green IRR	9.4%

## PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: FSC Certified Wood (Stockade Fencing)

Override with Green Product?

No

Final Product Choice

Green Product: FSC Certified Wood (Stockade Fencing)

### Notes:

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.
2. Green NPV and Green IRR are relative measures comparing Green vs. Conventional implementation.



Green Measure (GM):

# 1

Fencing

**STEP TWO: REPLACEMENT TIMING**

Remaining Useful Life of Existing Product  
Replacement Year

9

10

Final Product Choice

Green Product:

FSC Certified Wood (Stockade Fencing)

**Immediate Replacement**

Year

1

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	FSC Certified Wood	690	ls	\$21.00	\$14,490	25	1	1.0	\$14,490	\$14,490
Install/Replace	Dumpster Elcosure	2	ea	\$1,050.00	\$2,100	25	1	1.0	\$2,100	\$2,100
Total Life Cycle Cost									\$16,590	\$16,590

**Energy Savings**

Net Life Cycle Cost after Energy Savings									\$16,590	\$16,590

**Replacement at End of Remaining Useful Life**

Year

10

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	FSC Certified Wood	690	ls	\$21.00	\$14,490	25	10	0.6	\$8,302	\$7,786
Install/Replace	Dumpster Elcosure	2	ea	\$1,050.00	\$2,100	25	10	0.6	\$1,203	\$1,128

**Expenses for Current Product Through Useful Life**

Total Life Cycle Cost									\$9,506	\$8,914

**Energy Savings**

Net Life Cycle Cost after Energy Savings									\$9,506	\$8,914

**ECONOMIC RETURN ANALYSIS**

Timing NPV	(\$7,676)
Timing IRR	n/a

**TIMING RECOMMENDATION**

Replacement Year:

10

**Notes:**

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.
2. Timing NPV and Timing IRR are relative measures comparing Immediate Replacement vs. Replacement at End of Remaining Useful Life.

# Life Cycle Cost Analysis

Green Measure (GM):

# 2

Install Cement Board Siding

Maintain EFIS Brick Siding

vs.

Install Cement Board Siding

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term 30

Conventional Product:

Maintain EFIS Brick Siding

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

### Life Cycle Costs

Install/Replace	Repair/Replace	547	sf	\$4.55	\$2,489	5	1	6.0	\$22,303	\$8,950
Total Life Cycle Cost									\$22,303	\$8,950

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$22,303	\$8,950

Green Product:

Install Cement Board Siding

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

### Life Cycle Costs

Install/Replace	Replace w/ Cement Board	7,298	sf	\$8.50	\$62,033	30	1	1.0	\$62,033	\$62,033
Total Life Cycle Cost									\$62,033	\$62,033

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$62,033	\$62,033

## ECONOMIC RETURN ANALYSIS

Green NPV	(\$53,083)
Green IRR	(6.0%)

## PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Conventional Product: Maintain EFIS Brick Siding

Override with Green Product? No

Final Product Choice

Conventional Product: Maintain EFIS Brick Siding

### Notes:

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.
2. Green NPV and Green IRR are relative measures comparing Green vs. Conventional implementation.

Green Measure (GM):

# 2

Install Cement Board Siding

**STEP TWO: REPLACEMENT TIMING**

Remaining Useful Life of Existing Product

0

Final Product Choice

Conventional Product:

Maintain EFIS Brick Siding

**Immediate Replacement**

									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Repair/Replace	547	sf	\$4.55	\$2,489	5	1	6.0	\$22,303	\$8,950
Total Life Cycle Cost									\$22,303	\$8,950
<i>Energy Savings</i>										
Net Life Cycle Cost after Energy Savings									\$22,303	\$8,950

**ECONOMIC RETURN ANALYSIS**

Timing NPV	n/a
Timing IRR	n/a

**TIMING RECOMMENDATION**

Replacement Year:	1
-------------------	---

**Notes:**

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.
2. Timing NPV and Timing IRR are relative measures comparing Immediate Replacement vs. Replacement at End of Remaining Useful Life.

# Life Cycle Cost Analysis

Green Measure (GM):

# 3

Install Linoleum

Replace VCT In-Kind

vs.

Install Natural Linoleum

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term

25

Conventional Product:

Replace VCT In-Kind

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

### Life Cycle Costs

Install/Replace	Hallways	60	sf	\$5.00	\$300	15	1	1.7	\$564	\$415
Install/Replace	Office	224	sf	\$5.00	\$1,120	15	1	1.7	\$2,106	\$1,550
Install/Replace	Laundry	88	sf	\$5.00	\$440	15	1	1.7	\$827	\$609
Install/Replace	Dwelling Units	11,568	sf	\$5.00	\$57,840	15	1	1.0	\$108,761	\$80,067
Total Life Cycle Cost									\$112,258	\$82,641

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$112,258	\$82,641

Green Product:

Install Natural Linoleum

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

### Life Cycle Costs

Install/Replace	Hallways	60	sf	\$5.38	\$323	25	1	1.0	\$323	\$323
Install/Replace	Office	224	sf	\$5.38	\$1,205	25	1	1.0	\$1,205	\$1,205
Install/Replace	Laundry	88	sf	\$5.38	\$473	25	1	1.0	\$473	\$473
Install/Replace	Dwelling Units	11,568	sf	\$5.38	\$62,236	25	1	1.0	\$62,236	\$62,236
Total Life Cycle Cost									\$64,237	\$64,237

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$64,237	\$64,237

## ECONOMIC RETURN ANALYSIS

Green NPV	\$18,404
Green IRR	21.7%

## PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Green Product: Install Natural Linoleum

Override with Green Product? No

Final Product Choice

Green Product: Install Natural Linoleum

### Notes:

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.
2. Green NPV and Green IRR are relative measures comparing Green vs. Conventional implementation.

Green Measure (GM):

# 3

Install Linoleum

**STEP TWO: REPLACEMENT TIMING**

Remaining Useful Life of Existing Product

Final Product Choice

Green Product:

Install Natural Linoleum

**Immediate Replacement**

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Hallways	60	sf	\$5.38	\$323	25	1	1.0	\$323	\$323
Install/Replace	Office	224	sf	\$5.38	\$1,205	25	1	1.0	\$1,205	\$1,205
Install/Replace	Laundry	88	sf	\$5.38	\$473	25	1	1.0	\$473	\$473
Install/Replace	Dwelling Units	11,568	sf	\$5.38	\$62,236	25	1	1.0	\$62,236	\$62,236
Total Life Cycle Cost									\$64,237	\$64,237

**Energy Savings**

Net Life Cycle Cost after Energy Savings									\$64,237	\$64,237

**ECONOMIC RETURN ANALYSIS**

Timing NPV	n/a
Timing IRR	n/a

**TIMING RECOMMENDATION**

Replacement Year:	1
-------------------	---

**Notes:**

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.
2. Timing NPV and Timing IRR are relative measures comparing Immediate Replacement vs. Replacement at End of Remaining Useful Life.

# Life Cycle Cost Analysis

Green Measure (GM):

# 4

Install Recycled Content Countertops

Laminated Particleboard Countertops

vs.

Recycled Content (paper) Countertops

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term

25

Conventional Product:

Laminated Particleboard Countertops

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

### Life Cycle Costs

Install/Replace	LPB Countertops	16	ea	\$632.96	\$10,127	10	1	2.5	\$31,735	\$18,733
Total Life Cycle Cost									\$31,735	\$18,733

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$31,735	\$18,733

Green Product:

Recycled Content (paper) Countertops

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

### Life Cycle Costs

Install/Replace	Recycled Solid Surface	16	ea	\$1,350.00	\$21,600	25	1	1.0	\$21,600	\$21,600
Total Life Cycle Cost									\$21,600	\$21,600

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$21,600	\$21,600

## ECONOMIC RETURN ANALYSIS

Green NPV	(\$2,867)
Green IRR	5.4%

## PRODUCT RECOMMENDATION

### Recommendation based on Economic Return Analysis

Conventional Product: Laminated Particleboard Countertops

Override with Green Product? No

### Final Product Choice

Conventional Product: Laminated Particleboard Countertops

### Notes:

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.
2. Green NPV and Green IRR are relative measures comparing Green vs. Conventional implementation.

Green Measure (GM):

# 4

Install Recycled Content Countertops

## STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product

Final Product Choice

Conventional Product:

Laminated Particleboard Countertops

### Immediate Replacement

									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	LPB Countertops	16	ea	\$632.96	\$10,127	10	1	2.5	\$31,735	\$18,733
Total Life Cycle Cost									\$31,735	\$18,733
Energy Savings										
Net Life Cycle Cost after Energy Savings									\$31,735	\$18,733

## ECONOMIC RETURN ANALYSIS

Timing NPV	n/a
Timing IRR	n/a

## TIMING RECOMMENDATION

Replacement Year:	1
-------------------	---

### Notes:

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.
2. Timing NPV and Timing IRR are relative measures comparing Immediate Replacement vs. Replacement at End of Remaining Useful Life.

# Life Cycle Cost Analysis

Green Measure (GM):

# 5

Install Metal Roof Tiles

In-Kind (Composite Shingle) Replacement

vs.

Install Metal Tiles

(Conventional Product)

(Green Product)

## STEP ONE: PRODUCT COMPARISON

Calculated Life Cycle Term 50

Conventional Product:

In-Kind (Composite Shingle) Replacement

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

### Life Cycle Costs

Install/Replace	Composite Asphalt Shingles	7,945	sf	\$4.00	\$31,780	20	1	2.5	\$125,214	\$47,309
Total Life Cycle Cost									\$125,214	\$47,309

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$125,214	\$47,309

Green Product:

Install Metal Tiles

Cost over Life Cycle (EUL)

Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
--------	-------------	----------	------	-----------	------------	-----	------------	--------	----------	------------

### Life Cycle Costs

Install/Replace	Metal Tile Roofing	7,945	sf	\$9.50	\$75,478	50	1	1.0	\$75,478	\$75,478
Total Life Cycle Cost									\$75,478	\$75,478

### Energy Savings

Net Life Cycle Cost after Energy Savings									\$75,478	\$75,478

## ECONOMIC RETURN ANALYSIS

Green NPV	(\$28,168)
Green IRR	3.4%

## PRODUCT RECOMMENDATION

Recommendation based on Economic Return Analysis

Conventional Product: In-Kind (Composite Shingle) Replacement

Override with Green Product? No

Final Product Choice

Conventional Product: In-Kind (Composite Shingle) Replacement

### Notes:

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.
2. Green NPV and Green IRR are relative measures comparing Green vs. Conventional implementation.



Green Measure (GM):

# 5

Install Metal Roof Tiles

## STEP TWO: REPLACEMENT TIMING

Remaining Useful Life of Existing Product

Final Product Choice

Conventional Product:

In-Kind (Composite Shingle) Replacement

### Immediate Replacement

									Cost over Life Cycle (EUL)	
Action	Description	Quantity	Unit	Unit Cost	Total Cost	EUL	First Year	Cycles	Inflated	Discounted
Install/Replace	Composite Asphalt Shingles	7,945	sf	\$4.00	\$31,780	20	1	2.5	\$125,214	\$47,309
Total Life Cycle Cost									\$125,214	\$47,309
<i>Energy Savings</i>										
Net Life Cycle Cost after Energy Savings									\$125,214	\$47,309

## ECONOMIC RETURN ANALYSIS

Timing NPV	n/a
Timing IRR	n/a

## TIMING RECOMMENDATION

Replacement Year:	1
-------------------	---

### Notes:

1. Analysis performed using a discount rate of 8.00% and an inflation rate of 3.00% for both expenses and energy costs.
2. Timing NPV and Timing IRR are relative measures comparing Immediate Replacement vs. Replacement at End of Remaining Useful Life.

### **Statement of Delivery**

ON-SITE INSIGHT, Inc. (and/or its representatives) hereby certifies that, this Green Capital Needs Assessment (the “GCNA” or the “Report”) is delivered subject to the following terms and conditions:

1. This report and analysis are based upon observations for the visible and apparent condition of the building and its major components on the date of the fieldwork. Although care has been taken in the performance of this assessment, ON-SITE INSIGHT, Inc (and/or its representatives) makes no representations regarding latent or concealed defects that may exist and no warranty or guarantee is expressed or implied. This report is made only in the best exercise of our ability and judgment.
2. We have undertaken no formal evaluations of environmental concerns, including but not limited to asbestos containing materials (ACMs), lead based paint, chlorofluorocarbons (CFCs), polychlorinated biphenyls (PCBs), and mildew/mold.
3. Conclusions in this report are based on estimates of the age and normal working life of various items of equipment and/or statistical comparisons. Actual conditions can alter the useful life of any item. When an item needs immediate replacement depends on many factors, including previous use/misuse, irregularity of servicing, faulty manufacturer, unfavorable conditions, Acts of God and unforeseen circumstances. Certain components that may be working when we made our inspection might deteriorate or break in the future without notice.
4. To prepare this report, we used historic data on capital activities and costs, blueprints (when available), and current prices for capital actions. We have not independently verified this information, have assumed that it is reliable, but assume no responsibility for its accuracy.
5. Unless otherwise noted in the report, we assume that all building components meet code requirements in force when the property was built.
6. If accessibility issues are referenced in the report, the site elements, common areas, and dwelling units at the development were examined for compliance with the requirements of the Uniform Federal Accessibility Standards (UFAS), and for Massachusetts properties, the Massachusetts Architectural Accessibility Board (AAB). The methodology employed in undertaking this examination is adapted from a Technical Assistance Guide (TAG-88-11) titled “Supplemental Information About the Section 504 Transition Plan Requirements” published by the Coordination and Review section of the U.S. Department of Justice Civil Rights Division, and the AAB Rules and Regulations, 521 CMR effective July 10, 1987. The Guide also incorporates the requirements of UFAS, published, April 1, 1988 by the General Services Administration, the Department of Defense, the Department of Housing and Urban Development, and the U.S. Postal Service. Changes in legislation and/or regulations may make some observations moot.

7. Response Actions and estimated costs of responses were developed by ON-SITE INSIGHT, Inc. If additional structural work is necessary, costs for some Response Actions may exceed estimates. Whenever the Response Action is to remove, reposition, or modify walls, a competent structural engineer should be retained before any work is done, because such investigation may disclose that a Response Action is either more costly than estimated, or is not possible.
8. Conclusions reached in this report assume current and continuing responsible ownership and competent property management.
9. Regular updates of this plan are recommended to ensure careful monitoring of major building systems and to adjust the program to accommodate unanticipated circumstances surrounding the buildings, operations, and/or occupants.

Signed,



Signature

Daniel Iles  
Name

Associate  
Title

January 27, 2012  
Date